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Bertha W Smit

Honolulu I H

June 4th 1921



Sparattosperma vernicosum (Cham.) Bur. et K. Sch.
A Bignonia Tree growing on School Street, Honolulu

After a painting by D. Howard Hitchcock

THE
ORNAMENTAL TREES
OF HAWAII

BY

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AUTHOR OF THE

"THE INDIGENOUS TREES OF THE HAWAIIAN ISLANDS"

ISSUED, FEBRUARY, 1917

WITH SEVENTY-NINE PHOTO-ENGRAVINGS AND
TWO COLOR PLATES

PUBLISHED UNDER PATRONAGE

HONOLULU, HAWAII, 1917

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BY
JOSEPH F. ROCK

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To the early residents of Hawaii,
responsible for the introduction of the
many valuable ornamental plants,
this humble book is sincerely
dedicated.

Names of Patrons

Queen Liliuokalani

Charles H. Atherton	A. Gartley
Frank C. Atherton	M. M. Giffard
Frank F. Baldwin	Mrs. Allen Benton Hind
Bishop Museum	Robert Hind
E. F. Bishop	Rev. Hans Isenberg
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Samuel G. Wilder

PREFACE

During a residence of more than nine years in these lovely Islands, the writer has had opportunity in his connection with the Board of Agriculture and Forestry and the College of Hawaii, as Botanist, to devote all his time and lately part of his time to the study of the Hawaiian Flora. It is true he was not interested until lately in the introduced ornamental plants of Hawaii, but made the native Flora his specialty. The result of part of the writer's research was published under the title "The Indigenous Trees of the Hawaiian Islands."

Many have been the requests, however, for a non-technical volume treating the ornamental shrubs and trees of Hawaii and Honolulu especially, the need of which has long been felt. The writer took it upon himself to prepare such a book, which at first seemed an easy task. He was, however, sadly mistaken. While some of the trees did not give much difficulty as far as their identity was concerned, others again proved more elusive, especially such as belong to genera with numerous species. It took many journeys to all the by-ways of Honolulu in search of plants, and often the writer was told that in such and such a yard there was a tree which seemed to be the only one in Honolulu. Often the tale proved to be true, and occasionally it was a false alarm.

It may be stated that the plants treated or mentioned in this volume are represented by specimens in the College of Hawaii Herbarium, and that they have been critically worked up. They have not been cited from mere hear-say, but specimens were examined in every instance.

The nomenclature has been kept strictly in accordance with the laws laid down by the last Botanical Congress held at Vienna in 1905 and not according to horticultural dealers or gardeners, who simply apply a familiar name to a plant for the sole purpose of selling it more easily. This accounts for the many species of *Kentia*, while in reality none of the palms on the market as such have anything whatsoever in common with species of that rare genus. Nomenclature of such type belongs to commercial botany.

While the title of this book is a modest one it gives more information than is announced on the cover. The writer has treated not only the ornamental trees, but also shrubs and in addition has mentioned the fruit trees and ornamental vines. It is not claimed that this book includes all of the introduced trees, and, while it is a fairly complete presentation of the trees found in Honolulu and elsewhere

in the Islands, there still remain a few as yet unidentified; among them are a few species of the genus *Ficus*, which possesses six hundred species in all. Undoubtedly there are still a few odd trees in some out of the way locality to be heard from, and the writer hopes that this volume will stimulate the interest in the search for such. He would welcome a correspondence with anyone residing in this Territory who has a tree or trees not treated in this book, and would welcome the receipt of flowering and fruiting specimens for identification, with any facts known regarding the history of introduction.

The information given under each tree or shrub has been obtained from reliable works, the most noteworthy being "Watt's Dictionary of the Economic Products of India."

During his travels through India and Ceylon and other parts of the world, the writer himself has gathered facts regarding the useful qualities of some of the trees cultivated in Hawaii. In only a few instances was it possible to give historic data, as time of introduction and name of introducer. Such knowledge is scarce, and often not reliable.

The photographs illustrating this volume are original, and have been taken by the author save in one instance, plate XXVIII, which was taken by Mr. W. M. Giffard. It has now become the writer's property through gift.

The writer's sincere thanks are due to the patrons whose generous support made this publication possible. He is especially grateful to Doctors A. Romberg and A. L. Andrews of the College of Hawaii for the reading of manuscript and proof sheets.

The volume is herewith presented to the public with the hope that it will fulfill the purpose for which it was intended and arouse enthusiasm among the kamaainas for the protection of these trees entrusted into their care. Let them plant new generations of some of the single and odd specimens introduced by their forefathers, that they may not share the fate of some of our native trees.

Honolulu, October 13, 1916.

INTRODUCTION

It is really astonishing how many species of plants one observes when taking a walk through the older residential section of Honolulu. If even only slightly acquainted with tropical plants one soon learns to distinguish the species of plants (or trees) which adorn this beautiful city; indeed an arboretum in itself. The question arises, who is responsible for the introduction of the many wonderful plants. The writer is sorry to state that it was not always possible to ascertain the historical facts regarding each. Many of the older residents who knew or remembered the approximate date of introduction of some of the more striking plants, have passed away without leaving records regarding the origin of many of the plants now under cultivation in Honolulu. The Honolulu people have always been great travelers, and in the early days when voyages had to be made around the "Horn" sailing vessels usually stopped en route at South American ports and many seeds were thus gathered and brought to Honolulu, but the names of the plants, and where they came from were forgotten, and often even the place where they were planted. Save for a few old residents, actually and systematically interested in plant introduction, the majority of them brought things home in the above described manner.

The writer found some valuable information in the Proceedings of the Royal Hawaiian Agricultural Society of 1855 regarding the introduction of certain plants, and as the volume is not available, or known in general, he gives such facts as have bearing on the present subject.

It may be stated that the presence of many of the rarer plants in Honolulu is due to the indefatigable efforts of Dr. William Hillebrand, an ardent student of the Hawaiian Flora, and a long-time resident of these Islands where he held many prominent public offices. Honolulu owes him the profoundest gratitude.

The first white settler and agriculturist on the Island of Oahu was Don Francisco de Paula Marin. He came to the Islands in the vessel *Princesa Real* in 1791. From his arrival to the time of his death, which occurred in Honolulu on October, 1837 (63 years old), he devoted all his spare time to the cultivation of his garden. He kept a journal, which, at the time of his death, consisted of several volumes; his first entry was on Nov. 14, 1809. He relates on January 11, 1813, that he planted pineapples, an orange tree, beans, cabbage, potatoes, peaches, chirimoyas, horse radish, melons, tobacco, carrots, asparagus, maize, fig trees, lemons, and lettuce. It is not

at all surprising not to find a few ornamental plants among the list, for in those days Honolulu had little to offer in the vegetable line save taro and bananas, and for a European used to vegetables, living was indeed a difficult problem. He tells us that in 1815 he planted vines (grapes) for the king, and that on December 30, 1817, he set out coffee, cotton, cloves, tomatoes, turnips, pepper (capsicum), wheat, barley, castor oil, saffron and cherries.

Again it was Don Marin who made the first sugar in the Islands on the 25th of February, 1819. On the 22nd of September of the same year he tells us that he obtained his first orange from the tree planted eight years ago.

While these introductions have no particular connection with the plants concerning us in this book, it is, however, of interest to record them. The first introductions of seeds were those of melons, pumpkins and onions; they were landed on the Island of Niihau on Sunday, the first of February, 1778. Vancouver, on the fourth of March, 1792, presented to Kahaumoku, a chief on Hawaii (father of Kaahumanu), the first grape, orange, and almond seeds as well as other garden seeds.

To Don Marin or *Manini*, as he was called by the natives, who also named the Bermuda grass after him, which to this day is known as Manienie, is due first credit. It is only to be regretted that the whereabouts of his journal are at present not known. Other men actively interested in the introduction of plants were G. Wundenburg, W. L. Lee, E. Bailey, A. Jaeger and others, to mention only the earlier ones.

G. Wundenburg reports having successfully planted at Hanalei, Kauai, in 1849, the first *Inocarpus edulis*, Tahitian Chestnut, while Papaia, Chirimoya and Vi apples he planted in 1848, the seed having been brought from Tahiti. He also records the planting of a Tamarind in 1847, which flowered for the first time in May, 1852. In the same year (1847) he set out two date palms.

Numerous must have been the introductions of both ornamental and useful plants as early even as 1840, for W. L. Lee, president of the R. H. Agricult. Soc., writes on June 7, 1853: "Let those who wish to be convinced of the value of trees look back a few years upon the burned and barren yards of Honolulu and compare them with the cool and beautiful groves of our forest city." Numerous other references could be cited would space permit; suffice it to say, however, while general introductions were made no real efforts, at least no successful ones were inaugurated, for the

setting aside of a tract of land for a botanic garden and the systematic planting of such.

Dr. W. Hillebrand was one of the most ardent advocates of the establishment of such an institution, as can be observed from his addresses delivered before the R. H. Agricultural Society. He states that he had been in active communication with the botanic gardens of Rio de Janeiro and other like institutions and that he had planted 160 species in his grounds. Unfortunately the list giving the names which was to be appended was mislaid and could not be secured in time for the printing of the proceedings of the above mentioned society.

The reader will find the name of Mrs. Mary E. Foster on nearly every page in this book in connection with trees occurring on her premises, once the old home of Dr. W. Hillebrand, who was responsible for the introduction of all these plants.

Many plants were introduced by later generations, but the quoting of such instances would lead us too far.

More interest, however, should be taken in growing certain of these plants which are often represented by single specimens only. As they are now very old they are likely to succumb and could not well be replaced. Much could be said in regard to the taking care of and the planting of the various public gardens existing in Honolulu, and were their supervision in competent hands a good deal more could be accomplished, even with the limited funds on hand. For a matter of record the writer wishes to state that he introduced many ornamental plants new to Hawaii, from various parts of the world. He traveled through tropical Asia, the Dutch East Indies and other tropical islands for the sole purpose of introducing valuable ornamental plants. *Amherstia nobilis*, and species of *Brownea*, are among the latest introductions; they are considered the finest of all flowering plants known, but all previous efforts to introduce these plants had failed.

Great credit is due to Mr. G. P. Wilder for the introduction of many plants and likewise to the efforts of Mrs. F. J. Lowrey, President of the Outdoor Circle, and to that body in general for the great unselfish interest shown in the beautification of Honolulu.

May the spirit that inspired the past generations to make Honolulu a forest city, be the inheritance of the younger generation into whose care this city is entrusted.

May it always be "Honolulu the Beautiful."

CLASS GYMNOSPERMAE

NAKED-SEEDED PLANTS.

The seeds of these plants are not enclosed in a pericarp but are usually contained in a cone of some sort. As examples serve the cones of pine- or fir-trees. The plants belonging to this group are all woody, the majority of them are trees, only few are shrubs.

CYCADACEAE

To the family *Cycadaceae* belong our cultivated species of *Cycas*, one of which, *Cycas revoluta*, has often been erroneously termed *Sago palm*. This family comprises woody plants which are restricted to tropical and subtropical regions.

It is an extremely interesting group of plants on account of the position it occupies in the plant kingdom, intermediate between the ferns and the flowering plants. A few words in regard to the relationship of the cycads to other plants may not be out of place here. The Cycads are dioecious—that is, the male and female flowers are borne on different trees. The young foliage is rolled up exactly as in ferns. The male inflorescence grows in the form of erect cones, consisting of scales which bear globose pollen sacs underneath; the female inflorescence is in the center of the crowns of the leaves; and consists of pinnately notched leaves called carpophylls in whose notches the naked ovules are situated; pollination is effected by the wind. It has fruits like those of flowering plants, with starchy endocarp, but fertilization is accomplished by means of spermatozoids and archegonia, corresponding to the male and female elements in animals; this brings them closer to the Cryptogams, which are plants destitute of stamens, pistils, and true seeds.

***Cycas revoluta* Thunb.**

So-called SAGO PALM.

Cycas revoluta has a stout cylindrical trunk which does not branch and does not exceed three feet in height; the leaves are numerous, forming a crown horizontally around the apex of the stem. The leaflets are strongly revolute—that is, their margins are rolled back, hence the name "*revoluta*." As already remarked in the introduction under *Cycadaceae*, the plant is not related to the palms and is erroneously called Sago palm. It is a native of China and is now cultivated in many other countries besides Hawaii, and can often be found

Plate I.



Cycas circinalis L.

Growing in the grounds of Mrs. M. E. Foster on Nuuanu Avenue.

as a pot plant. There are possibly two more species cultivated in Honolulu: *Cycas circinalis* and *Cycas media*; these two seem to differ from each other only in that the latter branches, sometimes from the base, while the former has a simple stem with open loose whorls of leaves; both attain a height of fifteen or more feet in this Territory, while in some regions they reach a height of thirty-five feet, with trunks a foot and a half in diameter. A form of starch called Sago is obtained from the trunk of this plant, though the true Sago is derived from the Sago palm (*Metroxylon Sagus*) a palm indigenous in the East Indian Archipelago where it flourishes in low marshy situations. Sago is used principally as an article of diet, it is very nutritious and easily digested, and does not contain irritative properties. Sago is derived not only from the true Sago palm and from the so-called Sago palm, which is our *Cycas revoluta*, but also from a number of other plants belonging to different families.

***Cycas circinalis* L.**

Plate I.

Cycas circinalis L. is a palm-like tree of small stature differing from the so-called Sago palm *Cycas revoluta* in its taller stem and large open crown of leaves which are much longer than those of *Cycas revoluta*, often measuring six and a half feet. The trunk is usually single but often branching when the top has been cut off. There seems to be a doubt in regard to the systematic value of *Cycas media*, a species supposedly cultivated in these Islands. The latter has been described from Australia and is said to reach often a height of thirty to sixty feet and is rarely branched. The male cones of the latter are of various sizes but apparently smaller than in *Cycas circinalis*; otherwise the two species resemble each other.

Cycas circinalis bears nuts which are poisonous in their crude state, but are used for food by the natives of Guam after having been macerated in water and cooked. It is a native of the Moluccas but is found wild in Guam and in the mountains of the Malabar coast in India and also in Ceylon. The trunk also contains Sago. The seeds are so poisonous that even the water in which the seeds have been steeped is fatal to chickens. The seeds are usually ground into flour, and cakes are made which are baked like tortillas on a griddle. This is practiced in Guam as well as by the Cinghalese of Ceylon but only in times of scarcity. Among the Cinghalese it is reputed a remedy for some disorders.

The beautiful growth of this *Cycas* makes it a very desirable

ornamental plant, much more so than the rather stunted looking *Cycas revoluta*. The writer has observed *Cycas circinalis* growing wild in Guam, where they reach the water's edge, growing in calcareous sandy soil. The luxuriant growth and beautiful fronds recall pictures of the flora of the carboniferous age, in which this family played such an important part. The Cycadaceae form one of the oldest groups of plants, antedating the conifers.

PINACEAE

THE PINE FAMILY.

The family *Pinaceae* is represented in the Hawaiian Islands by a number of introduced species belonging mainly to *Cupressus* (Cypresses), *Cryptomeria*, *Araucaria* and *Agathis*; of the first named genus several species have been planted here, but mainly at the higher levels, as for instance, at Ulupalakua, and Olinda, Maui. The same may be said of *Cryptomeria*, of which genus the species *japonica* from Japan has been extensively planted on the uplands of Haleakala and in other similar places in the Territory.

Of *Cupressus* there are in cultivation: *C. sempervirens*, originally a native of Persia but now cultivated in many countries and easily recognized by its tall sharply cone-shaped growth; it is said to reach an age of more than two thousand years.

C. funebris, the mourning Cypress, can also be found; it differs from the former in its spreading crown and drooping branches. It is a native of China and North East India, but has been in cultivation in Europe since 1848. Mention must also be made of other cultivated species belonging to the *Pine Family*, as for example, *Podocarpus neriifolia* D. Don. and several species of *Dacrydium* which may be found on private premises about Honolulu. The two genera which, however, concern us most are *Agathis* and *Araucaria*, which are treated separately.

Agathis australis Salisb.

KAURI PINE (Syn. DAMMARA AUSTRALIS).

The *Kauri* is called the monarch of the forests of New Zealand, and while it does not reach such dimensions as its rival the giant Sequoia of California, it excels the Sequoia in its timber value, possessing many more good qualities than any other known pine. In its native home it reaches a height of one hundred to one hundred twenty feet, with a diameter of four to twelve feet and over, the

main arms are spreading, and themselves often two feet thick. The green leaves are thick, broad, and leathery, and have no resemblance to the needles of pines of the northern hemisphere. The bark of the *Kauri* abounds in resin, which exudes from the slightest wound. The young leaves are flat and narrow, while the mature ones are much shorter and more closely set. The male and female flowers are borne on the same tree, but in separate cones; the male catkins are cylindrical and appear in the axils of the leaves, the scales are really anthers or pollen sacs. The female cone is at the end of the branch, and carries on the upper surface of each scale a single ovule. In fruit the cone is almost spherical in outline and about three inches in diameter. Gigantic specimens can be found in New Zealand with trunks of twenty-four feet in diameter with an estimated age of four thousand years.

The *Kauri*, which was also termed *Cowrie Spruce* when first introduced into England, is remarkable for its soundness of timber, and no tree is known to retain its timber in a good condition so long after the greatest rate of growth has been passed.

In New Zealand several varieties are distinguished, such as Red Kauri, White Kauri, Black Kauri and Soft Kauri.

Red and White Kauri can be taken from the same tree; the former from the heartwood, which is much denser, the white from next the sapwood.

The timber is yellowish white, straight in grain, clean and of a silky aspect, of great strength and elasticity. Kauri logs which had been lying in the forest for over forty years were found to be perfectly sound after the vegetation with which they were completely overgrown was removed.

It is a lowland tree and becomes scarce at elevations over one thousand feet in New Zealand. In Honolulu the *Kauri pine* may be found in various residential grounds, the largest one in Mrs. Foster's premises on Nuuanu Avenue. Specimens may be found in the grounds of the Board of Agriculture on King Street and in the premises of the Spreckels home on Punahou Street. It was probably first introduced by Dr. Hillebrand.

All parts of the tree are charged with resin, which is at first colorless turpentine but solidifies when coming in contact with the atmosphere. This resin is known as Kauri gum. However, the resin which reaches the market is not derived from fresh resin secured by wounding the trees, but from fossil resin dug up from territories which were once covered by Kauri forests, this fossil resin is of a rich brown color, while fresh resin is dull white. It is found

in lumps varying from a few ounces to several pounds. The more transparent resin is used as a substitute for amber, while the ordinary gum is used in the manufacture of varnishes.

***Araucaria excelsa* R. Br.**

NORFOLK ISLAND PINE.

The genus *Araucaria* was established in the year 1789 by the Botanist Jussieu, who used the vernacular name *Auracanos* which had been applied to one of these trees by the inhabitants of Chile in South America. There are quite a number of species, *A. Cunninghamii*, *A. Bidwillii*, both of which are peculiar to Australia, while *A. excelsa* is peculiar to Norfolk Island, and *A. Cookii* is only known from the Isle of Pines off New Caledonia and from New Caledonia proper. The name *Norfolk Island Pine* is applied in Honolulu promiscuously to the four species cultivated here, but should be applied only to *A. excelsa*, as the other species have vernacular names of their own. The *Norfolk Island Pine* is one of the handsomest of the genus and exceeds often two hundred feet in height in its native country. It is closely allied to *A. Cunninghamii* and *A. Cookii*, though the latter have smaller cones; it is one of the most symmetrically growing Araucarias, and tall specimens may be found in various places about Honolulu. The Araucarias have sterile branches, the leaves of which are of two forms on a few species, as *A. Cunninghamii*, while they are uniform on *A. Bidwillii*.

On sterile branches the leaves are laterally compressed, sickle- to awl-shaped, while those of the fertile branches are triangular-lanceolate and shorter than those of the sterile branches.

In the United States there are about fifteen species of Araucarias in cultivation; the most popular is *A. excelsa* and its varieties, mostly horticultural varieties. According to Bailey about two hundred and fifty thousand potted plants of the species are sold in the States, nearly all being imported in a young state from Belgium, especially from Ghent, where the propagation of this species is made a specialty. Not only are they exported to the United States, but the world supply of this species for many years came exclusively from that source.

The Araucarias can be propagated from seeds as well as cuttings, and fine specimens can be grown from the latter when they are taken from the leading shoots instead of side shoots, and planted in sand.

Araucaria Cunninghamii Ait.

RICHMOND RIVER OR HOOP PINE.

Araucaria Cunninghamii is a pyramidal tree with a somewhat flattened crown and attains a height of one hundred fifty to two hundred feet in its native land, the north coast district of New South Wales and the southern coast of Queensland; it is one of the tallest Australian pines. The bark of this tree is quite characteristic, having the appearance of horizontal bands, whence it derived its name Hoop Pine. The leaves are of two different kinds; they are crowded and spirally arranged, prickly, and only about one-third of an inch long, while on the lower branches they are spreading, vertical, and often more than an inch in length.

The male amenta or catkins are cylindrical and two to three inches long. The cones are egg-shaped and about four inches long and three inches wide. The wood of this pine is very valuable and is largely used for furniture; it is whitish in color and has often beautifully grained markings. Owing to its inability to stand exposure it is valued mainly for indoor work, and is extensively used for flooring and lining boards. The bark contains an oleo-resin and gum which have not yet been used commercially. The aboriginal name of this pine is *Coarong*, while besides the above mentioned vernacular names it is known in Australia also as Moreton Bay Pine, and Colonial Pine.

Araucaria Cookii R. Br.

This species, which was named for Captain Cook, the great circumnavigator, is a native of New Caledonia and Isle of Pines off the coast of New Caledonia.

It is similar in habit to *Araucaria excelsa*, but the lower branches tend to fall off. The leaves are alternate and rather distant, broad and slightly decurrent—that is, they have a tendency to run down the stem; the old leaves are densely imbricated or overlap as the tiles of a roof, they are short, egg-shaped and not pointed.

In its native habitat the tree reaches a height of often two hundred feet with a perfectly straight shaft.

Araucaria Bidwillii Hook.

Plate II.

This valuable forest tree of the coast district of Queensland can be found cultivated in Honolulu though the specimens are not so

Plate II.



Araucaria Bidwillii Hook.
Growing on Nuuanu Avenue.

large as those of the other species. It appears to have first been made known to white men in 1838. A Mr. J. L. Bidwill took material of this tree with him to England and there the tree was described by Sir William Hooker.

In its native habitat the tree reaches a height of one hundred feet and is now much cultivated on account of its symmetrical shape and its whorled branches with spirally arranged leaves; the latter are of one kind, have no leaf stalk and are ovate-lanceolate in outline, not quite two inches long, and end in a very sharp point. The male catkins are arranged at the ends of the branches, are over six inches long and half an inch wide. The fruit cones are exceedingly large, twelve inches long and nine inches wide, and cones ten pounds in weight occur occasionally on trees in their native land. While they have as yet not flowered in Honolulu, they have borne fruit at Ulupalakua, Maui, and seeds have been secured there for plantings.

The aborigines of Queensland call the tree *Bunya* or *Bon-Yi*, and eat the nuts, of which they are very fond. The wood is of a pale color and is used for similar purposes as that of the Hoop Pine.

CLASS ANGIOSPERMAE

COVERED-SEEDED PLANTS.

This class includes all plants whose seeds are contained in a closed fruit, which is very various in structure and form. The largest number of trees belong to this class. They are again made up of two subclasses: 1. Monocotyledones, in which the embryonic plant within the seed possesses but a single leaf; the leaves are parallel-veined as in the banana, and gingers. II. Dicotyledones, in which the embryo has two seed-leaves; the leaves are pinnately or palmately veined.

SUBCLASS MONOCOTYLEDONES.

This subclass is distinguished by the simplicity of the stem-structure, the fibro-vascular bundles are arranged in a single column without a pith or medullary rays. There are no rings or radiating markings in the wood. A bark is absent, the outer portion being of the same structure as the inner, with the exception that the bundles are closer and more compact. Most of the plants belonging to this class are herbaceous, as for example, the grasses, bananas, lilies, etc., The Pandani and Palms are the arborescent species represented in our introduced flora.

PANDANACEAE

The family *Pandanaceae* is represented in Honolulu by the horticultural species *Pandanus Veitchii* Hort. a native of Polynesia, and the Hawaiian as well as cosmopolitan species *Pandanus tectorius* Sol. and a few of its varieties. *Pandanus Rockii* Martelli from the Island of Palmyra has been more or less extensively planted both on Oahu and Molokai. The first mentioned species has variegated leaves and forms large round clumps when left unmolested, the two others have bright green leaves and are more erect; the latter is slender in habit.

***Pandanus sylvestris* Bory.**

Pandanus sylvestris, an elegant species, is also cultivated in Honolulu. It is easily distinguished by the long pedunculate (stalked) syncarpium, which is depressed-globose, and composed of about thirty drupes, somewhat compressed and pyramidal in outline, the apex is slightly concave. A reddish or rose-colored ring surrounds the drupe at about the middle or part of adherence with the other drupes. The branching habit of this species is rather peculiar, the branches are horizontal and decrease in length upwards, the whole tree having the appearance of a pyramid.

It is a native of the Island of Reunion, but is cultivated in many botanic gardens. In Honolulu a mature specimen grows in the grounds of Lunalilo Home, near the entrance.

PALMAE

THE PALMS.

The most conspicuous and stately members of the vegetable kingdom are unquestionably the palms, one of the largest and most beautiful of all natural orders. The palms indeed supply many of our wants and minister largely to our comforts. The palms have been termed "The princes of the vegetable kingdom;" this title is, however, only a poetical one and is for several reasons objectionable. They are not placed pre-eminently at the head of the vegetable kingdom but occupy a more or less inferior position in that classified organization known as the Natural System of Plant Families. They belong to the same great division as the grasses, rushes, and lilies, etc., standing intermediate between the highest and lowest forms of plants. In their outward structure as well as in their internal arrangement they come nearest to the grasses, which, in contradistinction to the palms, have been termed by Linnaeus the Plebeians.

The stranger's attention is of course first of all drawn to the magnificent palms found throughout Honolulu, where as many as sixty to eighty species of these so-called princes hold forth.

The nature of this work forbids going into detail concerning every species of palm found cultivated in this Territory, as it would make a book in itself. Many have been introduced in recent years by enthusiastic horticulturists and the number of species found in the Territory now will probably amount to well over a hundred. Many of them, however, are as yet small plants and will be passed over without comment.

The writer wishes to call attention to the fact that in Hawaii there is a single indigenous genus (*Pritchardia*), represented by about eleven or twelve species growing wild in isolated regions in the mountains of these Islands. The genus *Pritchardia* is strictly speaking an oceanic genus with most of its species occurring wild in this Territory. Only one foreign species, *Pritchardia pacifica* Seem. et Wendl., a native of Fiji, is here in cultivation.

Mention must be made of various palms which are under cultivation in Honolulu but of which only very few, or sometimes only a singly specimen may be found. The most noteworthy and handsome of these are described below. *Actinophloeus Macarthurii* Becc., commonly known as *Kentia*; it is a soboliferous palm of great beauty but cannot endure strong wind on account of its fragile narrow stems. Two specimens may be seen at the entrance to Mrs. F. J. Lowrey's grounds corner of Victoria Street on the Punahou car line; another much stronger and fruiting specimen on King Street near the entrance to Kalakaua Avenue.

Howea Belmoreana Becc., and *Howea Forsteriana* Becc., are both commonly known as *Kentias*. Of the former a fine specimen is in Mrs. Foster's grounds on Nuuanu Street, and of the latter only a single mature one, in Mrs. Jaeger's place on King street. *Howea Belmoreana* differs from *H. Forsteriana* in the leaves, the segments of which are turned upward, and in the long flowering spike, which is produced singly in the axil of the leaf; while in *H. Forsteriana* the leaf segments are turned downward and the much shorter flowering spikes are produced in pairs or even groups of three from one leaf axil. Both are natives of Lord Howe Islands, from which name the generic name is derived.

Pinanga Kuhlii Bl., a very handsome, broad leafed, soboliferous palm, a native of the East Indian Archipelago, is found planted out in Mrs. Jaeger's premises. *Didymosperma (Wallichia) distichum*, the Sikkim Palm is exceedingly curious on account of its distichous

Plate III.



Phoenix dactylifera L.
Date Palms in Moanalua Gardens.

leaves, being arranged on two sides of the trunk only, as in the Traveler's Tree. A specimen now fairly well grown has been planted by Mr. Jordan on Wyllie street; it is the only one in the Territory. *Copernicia cerifera* Mart., the *Wax Palm*, is a native of northern Brazil, where it grows either isolated or aggregated in immense forests. It attains a height of twenty to forty feet. The leaves are covered by a glaucous bloom, and are arranged so as to form an almost perfect ball. A single specimen which flowers and fruits profusely, is in cultivation; it grows in the grounds of Mr. W. Macfarlane on Pensacola Street. *Archontophoenix alexandrae* W. et D., the *Alexandra Palm* of Australia, is quite plentiful in Honolulu. It is a tall pinnately leafed palm with short inflorescence and red subglobose fruits. Specimens occur in private grounds; two rather tall ones may be seen on King Street near the Board of Agriculture and Forestry building, and others on the premises of Lunalilo Home.

A few specimens of *Trachycarpus excelsa*, a small Chinese fan palm with blackish fibre around the base of the leaf stalks are also present in Honolulu but seem not to thrive well in this climate as they require a cold winter season. Specimens are located at the Queen's Hospital grounds, on Mrs. Jaeger's premises, and one or two on Wyllie Street in Nuuanu Valley. Closely related to it is *Chamaerops humilis* Linn. of which there are one or two specimens in cultivation in Honolulu. It is the *Dwarf Fan Palm* of southern Europe where it grows in abundance; it was known to the Romans under the name *Palma* probably on account of a certain resemblance of its leaves to the hand (*palma*). Later on the name was adopted for other members of the order until it was employed as the Family name of this wonderful group of plants.

Chamaerops macrocarpa Juss. is also under cultivation in Honolulu; fine specimens may be seen in Mr. Jordan's grounds on Wyllie street.

Phoenix dactylifera L.

THE DATE PALM.

Plate III.

The Date Palm is usually a stately tree with a tall trunk marked with the scars of fallen leaves. The leaves are pinnatisect, bearing linear segments, the lower segments often assuming the appearance of spines; they are moreover conduplicate at the base, a peculiarity distinguishing *Phoenix* from all other genera of palms. The flowers grow on branched spadices, which appear in the axils of the leaves and are dark yellow and dioecious. In order to make the tree bear



Coccothrinax argentea (Lodd.) Sargent
Cuban Palm.
Growing in St. Louis College grounds.

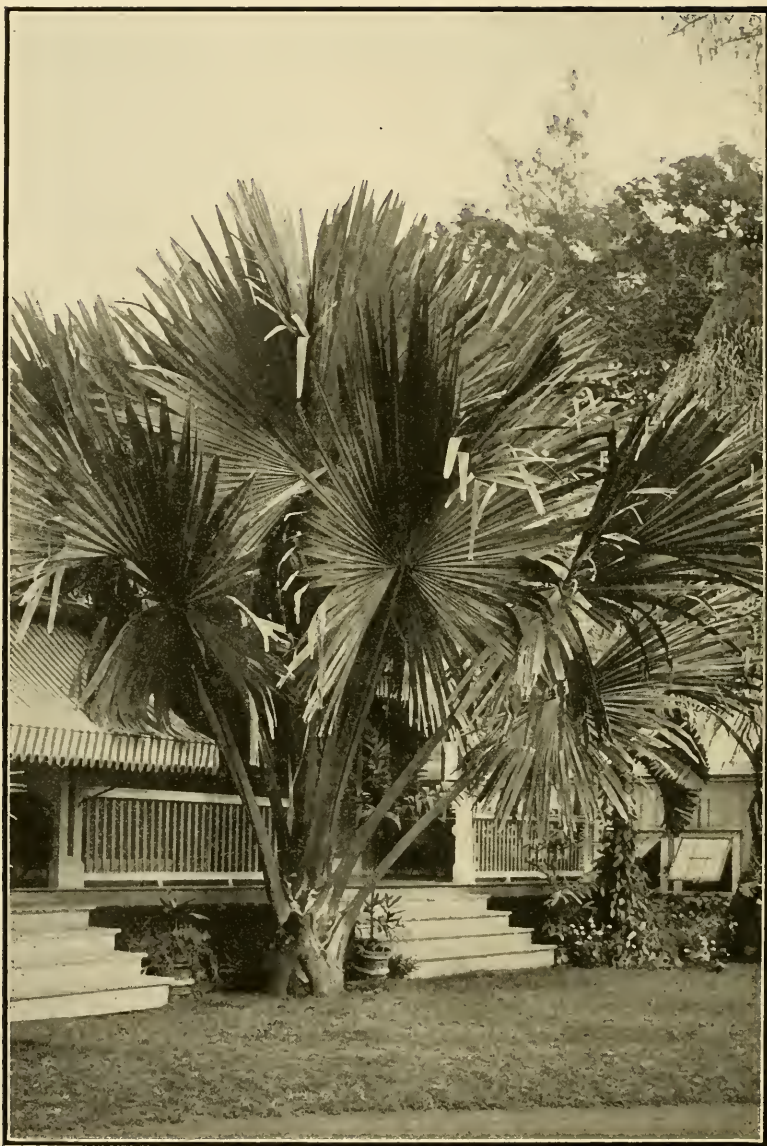
plentifully it is necessary to have recourse to artificial fertilization. The dates vary considerably in shape and size from round to oblong, they are a yellowish-brown drupe with generally only one seed.

Phoenix dactylifera L. has been cultivated in Asia, Africa, and Europe from time immemorial and it is as yet not known whether the East Indian species *Phoenix sylvestris* Roxb. is a wild state of *Phoenix dactylifera* L. Both of these species occur in Honolulu, but as they are hybridised by insects such a variety of hybrids exist that it is absolutely impossible to distinguish one from the other. The other species are in a similar chaos with the exception of *Phoenix spinosa* Thon. and *Phoenix reclinata* Jacq. and some botanists do not make any distinction even between these two. The two latter species occur in Honolulu and the difference between them seems quite evident. *Phoenix spinosa* is apparently soboliferous, that is it sends out shoots from the old root-stock, the trunk is slender and taller than in *Phoenix reclinata*, which has a rather short trunk and a different crown of leaves. Both are natives of the Cape of Good Hope.

Phoenix pusilla Gaertn., a rather handsome species, a native of Ceylon, has been planted in Kapiolani Park, in a group near the race track on the ocean side. It has a short gray trunk and stiff blue green leaves; the drupes are short and thick. In Honolulu there is a male specimen of Date Palm of low stature which the writer refers to *Phoenix humilis*. It occurs in Mrs. Jaeger's grounds on Beretania and Punahou streets. It is exceedingly handsome and deserves to be cultivated. There seems to be little difference between *Phoenix farinifera* Willd. and *Ph. humilis* Royle, both of which have short trunks and are soboliferous.

Of *Phoenix spinosa* there are only two specimens in Honolulu so far as the writer is aware, and both occur on the grounds of a private residence on Wilder Avenue near Pensacola Street. The fruit is borne profusely and is smaller, perhaps, than any other date. *Phoenix reclinata* Jacq. is represented by quite a number of specimens, the largest of which can be found in the Queen's Hospital grounds to the left of the main entrance under old date trees. Others are scattered over town in public gardens and private premises.

Phoenix canariensis Hort., the most commonly planted date tree in California is of ornamental value only; strange to say there are only about three or four specimens in Honolulu. Two, the oldest specimens, can be found in Mrs. Jaeger's grounds and others in the premises of the late Governor Cleghorn at Waikiki. It is easily



Corypha umbraculifera L.

A fine specimen of the Talipot Palm in Mrs. Jaeger's premises on King Street.

distinguished from the other dates by its very stout trunk which reaches several feet in diameter. The leaves are dark green and narrower than those of the ordinary date palm. It is a native of the Canary Islands, as the specific name implies.

***Rhapis flabelliformis* Ait.**

GROUND RATTAN PALM, OR BAMBOO PALM.

Rhapis flabelliformis is a low palm with caespitose roots and reed-like trunks, the leaves are palmate and terminal, and their petioles, especially at the base, are surrounded by a fibrous matting. The yellowish flowers are polygamo-dioecious. The *Bamboo Palm* is a native of the Island of Liu Kiu and Southern China, and is cultivated in oriental, especially Japanese, gardens for ornamental purposes. In Honolulu quite a number of specimens have been planted out in private premises, as well as in public parks. The oldest and tallest are in the late Governor Cleghorn's private garden at Waikiki. Its slender trunks are used to manufacture walking-sticks.

Rhapis Cochinchinensis Mart. is probably also under cultivation in Honolulu.

***Coccothrinax argentea* (Lodd.) Sarg.**

CUBAN PALM.

Plate IV.

The genus *Coccothrinax* consists of about sixteen species all of which occur in the floral regions of the Antilles or West Indies.

The silvery *Coccothrinax* is one of the handsomest species, but must be protected from wind, otherwise it will have a torn and ragged appearance.

It can be easily recognized by its slender, graceful stem and terminal fan leaves which are silvery-gray underneath. The green or greenish-yellow flowers are borne in axillary, branched spadices; the fruit is blackish-blue, round and one-seeded.

The leaves of the *Coccothrinax argentea* are manufactured into baskets and all kinds of wicker-work besides being employed for the famous chip hats in the West Indies, and are made into brooms in the Isthmus of Panama whence the tree has received the name of "*Palma de escoba*" or Broom Palm.

In Honolulu it is planted for ornamental purposes only and can be found in a great many residential grounds about the city. It is especially suited for planting in groves in well protected places.



Livistona chinensis Mart.

Chinese Fan Palm in the Pleasanton Hotel grounds.

Of late a number of species of *Thrinax* have been introduced, as for example *Thrinax parviflora* Swartz and *Thrinax radiata* Lodd., but as the specimens are quite small as yet they will not be commented upon. *Coccothrinax barbadensis* (Lodd.) Becc. may also be found.

Corypha umbraculifera L.

THE TALIPOT PALM.

Plate V.

The *Talipot Palm* is one of about five species belonging to the genus *Corypha*. It has a ringed trunk, generally remarkably straight and reaching a height of over eighty feet. Its leaves are of gigantic size if not the largest fan leaves of all palms. The petiole is seven feet long and armed with spines on the margins. The blade is about six feet long and sixteen feet broad with segments numbering from ninety-five to a hundred, which are again bilobed. The flowers are white to cream colored and are borne in huge terminal panicles often twenty feet long; hence the palm can flower but once, after which it must die. The fruit is a roundish one-seeded drupe.

This enormous palm is a native of Ceylon and the Malabar coast but is now cultivated in most tropical countries. The flowering time begins usually in the hot season, while the seeds ripen about nine or ten months afterwards. Each tree covers about two hundred superficial feet.

The leaves of this palm are made into fans, mats and umbrellas; the segments were used by the Cinghalese to write on, and the sacred Pali texts of the Buddhist literature of Ceylon are all written on the leaf segments of this palm which are supposed to have withstood the ravages of ages.

The seeds, which are hard like ivory, are employed in India in the manufacture of beads; they are sometimes colored red and sold as coral. The pith of the trunk of this palm yields a kind of Sago, it is beaten to flour and baked into cakes.

There are two specimens in Honolulu; the finest, here illustrated, grows in front of Mrs. Jaeger's residence on King Street; a small specimen which was kept in a pot but has now been planted out in the same grounds, is of the same age as the large specimen. Another, and probably older one, with a trunk of about ten feet was perhaps the first one introduced into Hawaii. It grows in Mrs. M. E. Foster's premises on Nuuanu Street.



Livistona australis Mart.

Growing on the Government Nursery grounds on Keeaumoku and
King Streets.

***Livistona rotundifolia* Mart.**

The *Livistonas* are remarkable for their elegant appearance and beautiful foliage, but they do not possess many useful qualities found in species of other genera. The genus consists of twelve or perhaps fourteen species, which are natives of India and Australia ranging from Assam and South China to the tropical North and sub-tropical East coast of Australia in New South Wales and even to Victoria.

Livistona rotundifolia is a tall palm reaching a height of forty-five to sixty feet with a straight smooth trunk, marked with close annular scars, the leaves are crowded at the apex, their long stalks are armed on the sides with hard sharp teeth; the leaf-blade is orbicular, cleft into numerous segments, one to two inches wide, which are again cleft at the apex into two lanceolate pointed lobes, two inches long; the base is heart-shaped and about three feet in diameter. The inflorescence is axillary, drooping, and over three feet long. The flowers are small, sessile and numerous; the fruit is globose, somewhat fleshy, yellowish-red, and about half an inch or more in diameter.

This palm is a native of Celebes in the Sunda Straits, but is cultivated in many tropical countries. The wood and leaves are employed for various economic purposes by the natives of Celebes.

In Honolulu this palm is sometimes met with, but is not so commonly cultivated as *Livistona chinensis* Mart. The finest specimens can be seen on Pensacola Street opposite the Makiki cemetery. Scattered trees occur here and there, as on King Street, Keeaumoku Street, and in the grounds of the Grammar School, the old residence of Princess Ruth Kelikelani.

Livistona chinensis* Mart.*CHINESE FAN PALM.****Plate VI.**

The *Chinese Fan Palm* is the palm most commonly met with in Honolulu. Its trunk is arboreous, gray, nearly a foot in diameter and unarmed. The palmate leaves are of a bright green, the petioles are furnished with spines at the edge, and copious fibres at the base. The white flowers are arranged in axillary panicles. The fruit is a drupe of the size of an olive with glaucous hue and orange-yellow fruit-flesh.

It is a native of Eastern Asia, but now most extensively cultivated



Erythea armata (L.) Watson.

Blue Palm, in fruit, on the grounds of Mr. Jordan's residence,
Wyllie Street.

for ornamental purposes in all tropical and subtropical countries. In Honolulu nearly every yard has one or more specimens. *Livistona australis* Mart., a much handsomer palm, is not at all common in Honolulu. The best specimens occur in the Government Nursery grounds, facing Keeaumoku Street. It differs from the former species mainly in the blue, globose seeds, and, as the name implies, is a native of Australia. There are a few other species of *Livistona* in cultivation in Honolulu, single specimens occurring in private grounds, but as yet not definitely determined. See Plate VII.

***Erythea armata* (L.) Watson.**

BLUE PALM.

Plate VIII.

The *Blue Palm* is indigenous in lower California and belongs to a genus of five species. This extremely handsome and ornamental palm has often a trunk of more than two feet in diameter in its naked portion while the part covered with the old leaves measures eight feet in circumference. The leaves, which are of the fan type, are rigid and intensely glaucous, and suborbicular in outline; the leafstalk is nearly four feet long, and very closely armed with compressed unequal spines, whence the specific name. The flowering branches are very long, often six feet or more, and droop to the ground when loaded with fruit, as can be seen in the accompanying illustration. When in flower this palm is an object of great beauty, which is enhanced by the handsome bluish symmetrical fronds.

It is a native of southern California, where it grows in canyons along dry water-courses. In Honolulu there are only two specimens in cultivation; the one figured was introduced by Mr. Jordan, in whose grounds it grows, the other, a less handsome specimen, may be seen in Kapiolani Park near the race track.

***Pritchardia pacifica* Seem. et Wendl.**

FIJI FAN PALM.

Plate IX.

The genus *Pritchardia* numbers about sixteen species, twelve of which are natives of the Hawaiian Islands, where the writer has discovered seven new species, five of which have been described by Dr. Beccari of Florence, and one by the writer, the remaining one will be described in the near future in a monograph on the Hawaiian species of that interesting genus.

Plate IX.



Pritchardia pacifica Seem. et Wendl.

Fiji Fan Palms.

Pritchardia pacifica was first described in 1861 and the genus named in honor of W. T. Pritchard, author of *Polynesian Reminiscences*, who was also British Consul in Fiji.

The Fiji Fan Palm seldom attains a height of thirty feet, its trunk is straight, unarmed, and ten to twelve inches in diameter at the base. The crown is globular, and composed of about twenty leaves, the petioles of which are covered at the base with a mass of brown fibre. The blade of the leaf is fan-shaped, usually four and a half feet long, and three and a half feet wide. The flowers issue from the axils of the leaves and are enveloped in several very fibrous, flaccid spathes. The inflorescence never appears below the crown, but always in the axils of the upper leaves. The fruit is perfectly round, half an inch in diameter, and when mature is of a blackish color.

The Fijians make the leaves into fans which are only used by the chiefs, while the common people have to content themselves with fans made of a Screw pine or Pandanus.

The fans are from two to three feet across and have a border of flexible wood. The Fijians never employ the leaves as a thatch, but the trunk is used for ridge beams.

The Fiji Fan Palm was probably introduced into the Hawaiian Islands in the early seventies, by Dr. Hillebrand. It grows exceedingly well in Honolulu, and owing to its beautiful shape and leaves deserves to be more generally cultivated. It is found here and there in residential premises about the city; the accompanying illustration shows a group of this palm in favorable circumstances.

***Washingtonia filifera* H. Wendl.**

CALIFORNIA FAN-PALM.

Plate X.

The genus *Washingtonia* consists of two or three species and a few varieties all of which may however belong to a single variable species. *W. filifera* seems certainly to be distinct from *W. robusta* H. Wendl., but the status of the third species, *W. sonorae* Hort., is doubtful. All three are peculiar to North America, where they occur in the desert regions of Southern California, especially in what is known as the Colorado Desert. *W. filifera* is now commonly met with in cultivation, especially in the southern parts of the United States and in southern Europe. In Hawaii the species in question has been much planted about homes and parks, especially in Kapiolani Park at Waikiki. Confusion exists in regard to the nomenclature of this



Washingtonia filifera H. Wendl.

Washington Palm in Kapiolani Park; the smaller palms are
Livistona chinensis Mart.

palm and another species known as *Washingtonia robusta*, also cultivated in Honolulu, but less common.

W. filifera differs from *W. robusta* in the much stouter trunk, stiffer leaves and in the leafstalks, which are spiny only at the base, while *W. robusta*, contrary to what the name implies, has a tall but more slender trunk, smaller and flaccid leaves, and petioles armed with spines up to the leaf segments. The ligule in *W. filifera* is triangular in shape, with membranous projections on the margins, a peculiarity missing in *W. robusta*. The latter species may be found in several places in Honolulu; fine specimens occur in the grounds of Ainahou, the former residence of the late Governor Cleghorn. Single specimens can be seen about town, as on Keeaumoku Street in Mr. W. M. Giffard's grounds, on Wyllie Street up Nuuanu Valley, in Mrs. Jaeger's garden near Beretania and Punahou Streets, and elsewhere. See Plate XI.

The Washingtonias are desert palms, growing wild in the extensive mesas of the Colorado Desert, the soil of which is stony, calcareous, clayey or silicious, according to the nature of the rock from which the soil is derived.

The above species were once referred to the genus *Brahea* and even to *Pritchardia*, a decidedly Polynesian genus, with most of its species peculiar to the Hawaiian Islands.

Sabal Blackburniana Glazebrook.

The trunk of this species of *Palmetto* is columnar-cylindrical, thick, and reaches a height of about forty feet, and a diameter of over one and a half feet. The trunk is naked, that is not clothed with the bases of the petioles.

The leaves are suborbicular and exceedingly large, with many segments, and a petiole of seven feet in length. The spadix is much shorter than the fronds, and branches three times, with the flowers densely set. The flowers are relatively large; the black shiny fruits are the largest in the genus. They are obpyriform, the vertex is rounded, while the base is very pointed, and symmetrical. The seeds are brown shining, globose and depressed.

This species occurs as a native exclusively in the Bermuda Islands but has been planted in gardens a great deal owing to its beauty and ornamental value. It is one of the most distinct species of the genus *Sabal* which possesses about eighteen species. It differs from *Sabal palmetto* in its large dimensions, short spadix and ob-pear shaped fruits. This species is much less common in Honolulu than



Washingtonia robusta H. Wendl.

Another species of Washington Palms in Ainahou, Waikiki.

Sabal palmetto. One fairly good specimen can be seen in the Capitol grounds.

Sabal Palmetto Lodd.

PALMETTO PALM.

Plate XII.

The genuine Palmetto reaches a height of sixty feet in its native home, begins flowering rather early, and has the trunk clothed with the old fronds, the petiole of which, especially the broad base, is divided into two divaricating parts. The leaves are suborbicular and have many segments (about eighty). The spadix forms large panicles which are drooping when in flower and are reflex-curved when in fruit. The fruits are perfectly spherical, slightly less than half an inch in diameter; the seeds are globose-depressed and hemispherical in the upper part.

The Palmetto is widely diffused over the United States extending from North Carolina to Florida. It is cultivated in Europe and other subtropical countries. In Honolulu it is much more common than *Sabal Blackburniana*. The specimen here illustrated occurs on the grounds of the Queen Emma home on Nuuanu Avenue. Others may be found on Beretania Street and King Street in various residential grounds, the Government Nursery and in the Punahou grounds along the stone wall facing Manoa road. The Palmetto is a useful palm. The young leaf-shoots in the center of the palm are edible and it is probably this species of which Martius writes that the soldiers of Panfilio di Narvaez kept alive upon for fourteen days during an exploration of Florida in the year 1528.

The young leaves are employed in hat making, being first bleached in a solution of oxalic acid and exposed to sulphur vapors. A wine is obtained from this palm and the fruits are eaten by the natives as well as by the birds, the latter being probably responsible for the wide geographical distribution of the tree.

This palm is grown and reproduced very easily and does exceptionally well in swampy ground. A small stemless *Sabal* is also under cultivation in Honolulu. It is known scientifically as *Sabal Adansoni* Guerns., and has an underground rhizome and only few fronds. Mature specimens may be seen at Haleiwa in the hotel grounds, and on Mrs. Jaeger's premises on King Street, to the left of the entrance. It is a native of the United States, extending from North Carolina to Florida, Arkansas and Texas where it inhabits inundated regions and can also be encountered near the sea. Many forms of



Sabal Palmetto Lodd.

Palmetto Palm on the grounds of Queen Emma Home, Nuuanu Avenue.



***Latania Loddigesii* Mart.**

Female specimen, growing on the grounds of Hawaiian Sugar
Planters' Experiment Station.

Plate XIV.



Borassus flabelliformis L.
Palmyra Palm in Kapiolani Park.

this species exist. Its variability in the States is similar to that of *Phoenix spinosa* in Africa and *Chamaerops humilis* in Europe. The polymorphism of this palm may principally be observed in the vegetative organs. It adapts itself to almost any climate and thrives in the hottest regions in India as well as in regions with frost.

***Latania Loddigesii* Mart.**

(Syn. *LATANIA GLAUCOPHYLLA* Hort.)

Plate XIII.

Latania Loddigesii is a dioecious palm reaching a height of fifty feet. The tomentose leafstalk of this species is three to four and a half feet long, the margins of the leaf segments are entire in the mature plant but spiny in the young plant, which is reddish. The old specimens are very glaucous or bluish green. The blade is three to five feet long, slightly tomentose on the veins beneath and tinged with red. The male spadix is five and a half feet long with eight to twelve branches. The female spadix is three and a half to four feet long with five to six branches. The drupe is obovate pear-shaped, trigonous, two and a half inches long by one and three-fourths broad, and contains usually three seeds. The seed is elongate obovoid with a central ridge with tree-like branching in the upper third.

This very robust and hardy species is a native of Mauritius but like many of the ornamental species has been cultivated throughout the tropics. When young it makes a very decorative pot-plant and resembles *Latania commersonii* J. F. Gmel. greatly.

In Honolulu numerous specimens occur; it is easily distinguished by its large glaucous-whitish fan leaves and large pear-shaped fruits.

***Borassus flabelliformis* L.**

PALMYRA PALM.

Plate XIV.

The *Palmyra Palm* is one of the species of the genus *Borassus* which enjoys the widest geographical distribution. It ranges from the northeastern part of Arabia through India to Ceylon and Burmah where immense groves of this remarkable plant may be found on the banks of the Irrawaddy below the capital of Burmah. From Burmah it extends through Netherlandish India to New Guinea. A mature specimen is from sixty to seventy feet high with a trunk about five and a half feet in circumference at the base. The stiff



Coelococcus carolinensis Dingl.

A Caroline Ivory-nut Palm on Mr. Scott's premises in Hilo, Hawaii.

fan-shaped leaves extend from the base to the top of the tree up to forty feet in height when undisturbed, only the older specimens showing a trunk. The petioles become from three to four feet long and are armed with spines on the edges, being silicious and serrated. The foliage is distributed in three spiral rows around the trunk; the blade has from seventy to eighty rays and each tree has from twenty-five to forty fresh green leaves at a time. The male and female flowers are produced on different trees and appear about the twelfth or fifteenth year after planting. The sex of the tree cannot be determined till that time. The fruits of the Palmyra Palm vary considerably on different trees. They fall to the ground when ripe.

The Tamils of India enumerate eight hundred and one uses for this species. The flower stalks are tapped for toddy similar to the wine palm, the fruits roasted or eaten raw. A fibre is extracted from the leafstalks and is used for rope and twine making, it is exceedingly strong and wiry. Toddy (the sap) is boiled down to sugar, the quantity of sugar made from the juice of this palm is very considerable. The peduncles are the portion tapped, and tapping is done only before flowering has begun, the sap is collected in pots tied to the cut peduncle. The germinated seeds, that is the young seedlings, are eaten as a vegetable. The outer shell of the trunk is exceedingly hard, consisting of a solid mass of thick fibro-vascular bundles. It is employed for various purposes, and is stated to support a greater cross-strain than any other known wood; the center is soft. In medicine the sap plays an important part and is used as a laxative; a poultice of the toddy with added rice flour is a valuable stimulant application to gangrenous ulcerations and carbuncles. Other parts of the palm have also valuable medicinal properties.

Only three specimens are known to the writer in Honolulu; the best occurring in Kapiolani Park (see illustration). The others are in the grounds of the Board of Agriculture and Mrs. Jaeger's premises respectively. None of these specimens have as yet flowered. The specimen in Kapiolani Park was unfortunately trimmed and robbed of its lower leaves by the inexperienced care-taker.

Coelococcus carolinensis Dingl.

CAROLINE IVORY-NUT PALM.

Plate XV.

The *Ivory-nut Palm* reaches a considerable height and has stout pinnate leaves of a dark green color. The spheroid fruits are about



Caryota urens L.

A fruiting Wine or Fish-tail Palm on Mr. Charles Atherton's grounds,
King Street.

three and a half inches in diameter, and are covered with a reddish brown, glossy, scaly shell, which fact places the palm into the tribe *Lepidocarineae*. The nuts are of ivory-like texture; the surface of the seed is black and shiny, striped but not furrowed. It is a native of the Caroline Islands and according to Brother Mathias Newell of Hilo, to whom the writer is indebted for the following information, a few of these palms were brought to Hilo by Dr. Wetmore, from Micronesia about thirty years ago. One of these he planted on his premises where it still stands, but it has not borne fruit as yet. Another was given to Miss Ellen Lyman who planted it. This specimen bore abundant fruit, but was cut down to make room for a building. Mr. Scott of Hilo bought about twelve nuts of this species from a sea-captain who came from the South Seas in 1886. Only three of these seeds germinated and but one survived. This latter, here illustrated, is now a magnificent specimen and bears fruit in abundance.

The nut yields the commercial vegetable ivory and was formerly exported from the Caroline Islands to Germany for button making. There are no specimens of this palm in Honolulu.

***Caryota urens* Linn.**

WINE PALM, FISH-TAIL PALM.

Plate XVI.

Caryota urens L. is the oldest and best known species of the genus *Caryota*. It is a lofty palm with a trunk of often forty feet in height and a foot in diameter. The leaves are very large, often measuring eighteen to twenty feet in length and from ten to twelve across. It is one of the few palms with twice pinnate leaves; the leaflets terminate abruptly somewhat resembling the dorsal fin of a fish, whence the name *Fish-tail Palm*. When it has attained its full height it begins to flower near the apex of the trunk, the flowers being arranged on long hanging racemes, which are produced in downward succession till the palm dies. The reddish fruits are globose and fleshy, the seeds are reniform and the sour juice contained in the fruit produces an irritation of the skin whence the specific name *urens* meaning stinging.

It is a native of Malabar, Bengal, Assam and various other parts of India where it grows in moist forests. To the natives of India this palm is highly valuable on account of the large quantity of toddy or palm wine which it yields, and Dr. Roxburgh states that the best trees will yield at the rate of a hundred pints in twenty-four



Arenga saccharifera (Wurmb.) Labill.

Sugar Palm.

hours, and the sap continues to flow for about a month. When fresh the toddy is pleasant, but it soon ferments, and when distilled becomes the *arrack* or gin of India. Sugar is also obtained by boiling the toddy. The trees are tapped when they are twenty years old; the portion tapped is the flower stalk. Tapping is continued for eight months in the year, till the rainy season commences, the trees then become too slippery to be climbed. The trees are however not allowed to rest but are tapped till exhausted. The pith or farinaceous part of the trunk is valued as sago which is said to equal that of the true *Sago palm* (*Metroxylon sagus*). It is made into bread and boiled into thick gruel. From the leaves a fibre is produced called Kittul, which is very strong and is made into ropes and other articles.

The *Wine Palm* was once extensively cultivated in Honolulu but the old trees have begun to flower and the majority of them have died; still a goodly number may be observed in private grounds, most of them however in a flowering state. As no young palms of this species are being grown it will be only a few years at the most when this rather handsome species will have disappeared entirely from Honolulu. The specimen illustrated grows in Mr. Chas. Atherton's grounds on King street.

Caryota mitis Lour., another species belonging to the genus *Caryota*, is cultivated in Honolulu, but there are only very few specimens, the best one occurring in the Mausoleum grounds on Nuuanu Avenue. It differs from the *Wine Palm* in its soboliferous habit, small stature and very thin trunk and has a rather bushy appearance. The seeds are much smaller than in the foregoing species. It also is a native of India.

***Arenga Saccharifera* (Wurmb.) Labill.**

SUGAR PALM.

Plate XVII.

The Genus *Arenga*, numbering about ten species, is distributed from tropical Asia and Malay to Australia, with five species in the Philippines.

The *Sugar Palm*, which occurs throughout the Philippines and

is in cultivation in Honolulu and possibly on Hawaii, is a native of India and Malaya. Its stout trunk, marked with rather distant annular scars reaches a height of thirty to thirty-six feet. The leaves are stiff, ascending, and the basal parts and trunk are clothed with stout black fibre.

There are more than a hundred leaflets on each side, which are linear, with lobed and variously toothed apex. The stout flowering stalks, which are axillary, together with the drooping branches, are up to five feet in length. The very abundant fruits of the *Sugar Palm* are globose-depressed, and about two inches in diameter.

The fibre found at the base of the petiole, is black and resembles horse hair. It is employed in China in caulking the seams of ships, and is also used as tinder for kindling.

It is also employed for the making of moisture resisting ropes and cables. This fibre is known in India as Eju.

From the interior of the stem sago is procured, which is however, inferior to that obtained from the true Sago Palm, but is nevertheless an important article of food, and is the source of the Java Sago. By certain people in India, the young and blanched leafstalks are eaten as a pickle while the young kernels are made into preserves with syrup.

The sap of the palm, from which wine, sugar, and vinegar are prepared, is obtained in the following manner: One of the spadices or flowering stalks is, on the first appearance of the fruit, beaten on three successive days with a small stick, with the view of bringing the sap to the wounded part. The spadix is then cut a little way from its root (base) and the liquor which pours out is received in pots of earthenware, in bamboos or other vessels. The Sugar Palm is fit to yield toddy or palm wine when nine or ten years old and continues to yield it for two years at the average rate of three quarts a day. After the tree ceases to yield toddy it is cut down and the trunk then furnishes the starchy substance known as sago. The liquid is at first clear, but becomes turbid, whitish and somewhat acid in a short time, acquiring intoxicating qualities. It is in this state that great quantities are consumed. To obtain sugar the liquid is boiled to a syrup, and cooled in small vessels, the form of which it takes, and in this shape is sold in the markets.

The sugar obtained is dark and greasy, with a peculiar flavor.

According to an estimate a field of thirty acres planted with these trees should produce two thousand four hundred kilograms of sugar in a soil quite unfit for any other kind of culture.

In Honolulu only a few scattered trees of this palm can be found.

In the Punahou grounds several trees may be observed as well as in the grounds of some of the old residences in Honolulu. Its cultivation for ornamental purposes has not been encouraged as it is not a very beautiful plant and dies after having flowered for some years.

***Arenga obtusifolia* Mart.**

Plate XVIII.

This species is closely allied to the *Sugar Palm*, but differs from it in its more slender trunk and its stoloniferous habit—that is, it sends out underground rhizomes which send up young shoots at internodes as much as ten feet or more from the parent tree. Thus one mature tree may produce quite a number of specimens by vegetative reproduction.

It is much handsomer than the *Sugar Palm* and much more graceful. The trunk is ringed and gray; the leaves always dark green above and dirty white underneath. The flowering spikes are pendulous, and in the species in question the male spikes appear near the base of the trunk while the female ones are produced in the uppermost portion. Like the *Sugar Palm* it is a native of the Indian Archipelago, dense shady forests being its favorite locality.

In Honolulu it is found only in two places, the handsomest specimens are in the grounds of Dr. Hillebrand who undoubtedly introduced it, and others are at Waikiki in the late Governor Cleghorn's premises. All species of the *Arenga* flower only once during the term of their existence.

***Hyophorbe amaricaulis* Mart.**

BOTTLE PALM.

The *Bottle Palm* reaches a height of sixty feet in its native land, with a bottle shaped trunk fifteen to twenty-four inches in diameter near the base, diminishing slightly upwards and becoming abruptly constricted near the base of the leafsheaths.

The leafsheaths are somewhat trigonal and grooved on the face. The leaf consists of forty to sixty pairs of segments about eighteen inches long and two broad. The spadix branches in clusters, with a main stalk of about a foot. The fruit is elliptical, oblong; the seed elliptical and about half an inch long.

This rather ungainly palm is a native of the Island of Mauritius and not known to occur wild elsewhere. It is cultivated in Honolulu and can be met with quite frequently in private grounds. The



Arenga obtusifolia Mart.

Another species of Sugar Palm in Mrs. M. E. Foster's grounds,
Nuuanu Avenue.

specimens in Honolulu are usually less than fifteen feet tall. Two can be seen at the entrance to the building of the Board of Agriculture on King Street.

Hyophorbe Verschaffeltii Wendl. is another species belonging to the genus *Hyophorbe* which is peculiar to the Islands of the Mascarene group. It differs considerably from the *Bottle Palm*, mainly in the trunk, which does not reach such a height nor such a diameter and does not seem to bulge, at least not to the extent of the bottle palm, and then only a few feet above the ground. The pinnae have no prominent lateral nerves as in the former species, and the petiole has a distinct yellow line on the back. The drupe is cylindrical-oblong, the seed subcylindrical and an inch long. This species is quite rare in Honolulu; the writer knows of only four mature specimens, one in the grounds of "The Roselawn" on King Street near Keeaumoku Street, the others in Mrs. Jaeger's and Mrs. Foster's grounds. Mention must be made of *Hyophorbe (Chrysalidocarpus) lutescens* Hort., a very handsome house palm, but planted out in Honolulu in several places. The largest specimen can be seen in the Moanalua Japanese Garden, while smaller specimens have been planted in the Japanese Consulate grounds on Nuuanu Street. It is generally known under the name of *Areca lutescens* and sold as such by horticultural dealers.

Oreodoxa regia II. B. K.

ROYAL PALM.

Plate XIX.

The name *Oreodoxa* which has been taken from the Greek and is composed of a double word meaning "mountain" and "glory," has been applied to a tropical American genus consisting of five species. One is now cultivated in many tropical countries and is much planted in Honolulu.

The Royal Palm has a whitish stout trunk reaching a height of seventy-five to one hundred twenty feet, and is usually swollen in the middle, tapering above and below; the base is also swollen and is often twenty-four inches in diameter. The leaves are crowded at the apex, their sheaths are elongated and overlapping; the very numerous leaflets are narrow and pointed; the inflorescence is borne below the leaf-sheaths. The spadix is large, the branches long, slender and drooping, the two cylindrical spathes or flower bracts are as long as the spadix or fleshy flowering spike. The flowers are

Plate XIX.



Oreodoxa regia H. B. K.

In the grounds of the old Claus Spreckels residence on Punahou Street.
The plant to the left is *Ravenala madagascariensis*, Traveler's Tree.

small and monoecious. The fruit is a drupe, or stone-fruit, and is oval-oblong and violet blue when mature.

The Royal Palm, a native of Cuba and tropical America is the most typical of the genus *Oreodoxa* and is the most common palm in Cuba, where it is similarly used, as in Honolulu, for avenues, a purpose to which it is admirably adapted. The peculiarity of this palm is that there rises upon the white part of the trunk a grass green smooth shaft, appearing like a column placed upon another; it is from this green shaft that the leaf-stalk springs.

It is said in the West Indies, that the broad part of the foot-stalks of the leaves, which form a hollow trough, are used by the negroes as cradles for their children, and when cut up make excellent splints for fractures.

In Honolulu this palm is one of the most frequently cultivated and is especially used along drive-ways as its royal bearing makes it especially desirable for such purposes. The picture here reproduced shows a portion of the residential grounds of the old Claus Spreckels place on Punahou Street. In the immediate foreground is a Traveler's tree, to the left a Chinese fan palm and to the right Royal Palms. This species has been in the Islands since 1850.

***Oreodoxa oleracea* Mart.**

CABBAGE PALM.

The trunk of the *Cabbage Palm* is not ventricose like that of the *Royal Palm*, but is of even thickness, of large diameter, and reaches a height of one hundred fifty feet. The leaf segments are linear-lanceolate and pointed, the pinnae are bi-fid at the top, the petiole long-sheathing. The spadix appears at the base of the cylinder formed by the leaf-sheaths as in the *Royal Palm*, but of larger dimensions. The drupe is incurved, obovoid-oblong while that of the *Royal Palm* is ovoid. The *Cabbage Palm* is therefore most easily distinguished when mature enough for bearing, by its trunk, which does not bulge at the middle, its more robust habit, and the obovoid oblong seeds.

It is a native of the West Indies and is one of the loftiest of all Palms. The broad part of the leaf stalks forms a hollow trough which is employed as a cradle for the negro children; when cut up it makes excellent splints for fractures. The heart is made into pickles, or when boiled is served as a vegetable, hence the name *Cabbage Palm*.

In Honolulu mature specimens of this stately palm occur only in Mrs. M. E. Foster's grounds, once the property of Dr. Wm.



Archontophoenix Alexandrae H. Wendl. et Drude

Alexandra Palm.

Growing at Moanalua Gardens.

Hillebrand, who introduced this fine species. Of late it has been grown from seeds, and many trees have been planted out, especially in Manoa Valley.

Archontophoenix elegans Wendl. et Drude

(SYN. SEAFORTHIA ELEGANS R. BR.)

Archontophoenix elegans is a very stately palm with an unarmed ringed trunk and large pinnatisect leaves with reduplicate eroded segments. The flowers are polygamo-dioecious, and are borne on branched spadices, and are of a green color. The fruit of this species is about a third of an inch in diameter but often longer than broad. The albumen is strongly ruminant, often to the very center of the seed.

This handsome species is a native of tropical Australia but has been in cultivation in nearly all tropical countries. It is one of the palms sold by dealers as a house plant, for which it is well adapted on account of its elegant habit.

Several specimens have been planted out in Honolulu and are already bearing an abundance of fruit. *Archontophoenix alexandrae* W. et D., a native of Australia, is, however, much more common in Honolulu. See Plate XX.

Dictyosperma album Wendl. et Drude

(Syn. D. (ARECA) RUBRA HORT.) RED PALM

Plate XXI.

Dictyosperma album, the so-called *Areca rubra* or *Red Palm* of the horticulturists, is a stately palm with a trunk forty to fifty feet in height and a diameter of eight to nine inches, somewhat dilated at the base. The pinnate leaves are eight to twelve feet long and have an almost round petiole six to eighteen inches in length. The pinnae are two to three feet long, two to three inches broad, have one prominent medial nerve, and three lateral ones on each side. The veins and margins of the pinnae are green or reddish. In its young state it has dark green leaves with deep red margins and veins, the redness disappearing in the adult plants. The spadix is two feet long with quite reflexed branches twenty to thirty inches in length. The fruit is ovoid-oblong, pointed, about half an inch long, and purplish.

This is a very variable species, of which several forms are known



Dictyosperma album H. Wendl. et Drude
Red Palm in Queen's Hospital grounds.

under horticultural names. It is cultivated very extensively in Honolulu and Hilo; almost every yard having a specimen or two.

It is a native of the Island of Mauritius, but has become a favorite palm in the gardens of many tropical countries.

Areca Catechu Willd.

THE BETEL-NUT PALM.

See Plate LVI.

The *Betel-nut Palm* is of elegant growth, rising with a very erect and slender trunk to the height of forty or even sixty feet; the summit is a tuft of beautiful dark foliage. The trunk is rarely more than six or eight inches in diameter, and is dark green when young, becoming dark gray with advanced age. The trunk is ringed with the marks formed by the clasping leaf stalks. The tree ripens its fruits only once during the year. The long branches with large ovate, orange-colored fruits, which are pendant from the upper part of the trunk, enhance the beauty of the tree and are in pleasing contrast with the dark green pinnate foliage. The exact native home of the Betel-nut is not known, but is supposed to be the Sunda Islands. Like the *Coconut* it has been introduced into many tropical countries and even into Europe and America where it is grown as a hot-house plant. While the species in question is fairly common in Honolulu and Hilo, it is not so plentifully cultivated as other palms, as for instance, *Dictyosperma album*. The largest and finest, also probably the oldest specimens of the Betel-nut palm can be found in Mrs. Mary E. Foster's premises where they were planted by Dr. Hillebrand. Any traveler who has even only passed through Burmah, Bengal, or other lands and islands inhabited by tribes related to the Malayan race could not help but observe the brick-red lips, black teeth and otherwise offensive appearance of the mouths of the native inhabitants. It is caused by the chewing of the Betel-nut, together with lime, tobacco, and an astringent substance known as Gambir and the leaves of various species of pepper, as for instance, *Piper betle*, *Piper meythisticum* (the Hawaiian *Awa*). The nut is deprived of its fibrous husk, divided or grated, wrapped in the piper leaf with a pinch of quicklime and as such is known as the *Pan* of India. It injures the teeth, but has a fine aroma, and the odor it imparts to the breath is quite agreeable. It is also stated that *Pan* increases or excites appetite and aids digestion. The active principle of the Areca-nut is *Arecaïne* and is a powerful agent for destroying



Elaeis guineensis Jacq.

Oil Palm in the Pleasanton Hotel grounds.

tape-worm. It is highly poisonous, like nicotine, and a half grain is sufficient to kill a rabbit in a few moments.

***Elaeis guineensis* Jacq.**

OIL PALM.

Plate XXII.

The genus *Elaeis* consists of about six or seven species which are natives of tropical America and Africa. The name *Elaeis* is taken from the Greek meaning "Olive."

The true *Oil Palm* grows erect, is twelve to thirty feet in height and bears at the apex of the trunk numerous pinnate leaves ten to fifteen feet in length; the leaf-stalks are broad, and serrated. The leaflets are numerous, linear lanceolate, pointed, nearly three feet long and one to two inches wide; the male inflorescence is dense, and consists of numerous, cylindrical spikes less than half an inch in diameter. The female inflorescence is also dense and branched, and the fruits are borne in large dense masses.

The *Oil Palm* is a native of tropical Africa but is now cultivated in many tropical countries. The drupes or fruits of the Oil Palm, which are one-seeded, have an oily husk of a bright vermilion or more or less yellow color. The fruit of this species yields an oil, which is of great economic importance in some regions.

According to Dr. Vogel* the Africans prepare a palm soup from this species, a dish which, when made of boiled palm-nuts only, is of a delightful flavor. The natives pick the nuts off young trees which have not yet lost any of their leaves, and consider them superior to the fruit of older plants; they also cut down the trunks to collect palm wine. Two products are exported, the oil derived from the reddish exterior of the pulp of the fruit and the kernel which is used in Europe for the extraction under pressure of another oil, similar to that of the coconut and used for like purposes.

In Honolulu this palm is not very plentiful and its cultivation for ornamental purposes has been neglected on account of the clumsy appearance produced by its short, thick trunk. An avenue of these palms leads from the main entrance of the Capitol grounds to the Capitol building, but they are rarely in fruit now. Single specimens may be seen here and there about Honolulu. In the Pleasanton Hotel grounds, fairly mature specimens line the driveway from the College Street corner, bearing profusely.

* Hoker's Niger Flora.



Attalea cohune Mart.

A Cohune-nut Palm in Moanalua Gardens. Palm to the right is
Phoenix dactylifera L.

Attalea Cohune Mart.

COHUNE NUT PALM.

Plate XXIII.

The *Cohune Nut Palm* belongs to the genus *Attalea*, which numbers about twenty members, all natives of tropical America. The species in question is the northernmost of the genus. Its trunk is about forty feet high, rarely taller, its leaves are thirty feet long and the leaflets three feet in length. The flowering spathes appear between the leaves, and bear yellowish flowers, and ovate fruits the size of a hen's egg, of a brownish color, containing from one to three seeds. The fruits grow in clusters each cluster resembling a huge bunch of grapes.

The *Cohune* trees yield one crop of nuts each year. An oil is extracted from the nuts which is said to be superior to coconut oil: the odor is more pleasant. The strongest argument in favor of cohune nut oil is that one bottle of the oil extracted is said to burn as long as two bottles of oil from the coconut. The leaves are employed as thatch, and from the trunk a palm wine is prepared.

The *Cohune* is a native of the Isthmus of Panama and is cultivated on account of its grandeur. It is well adapted for street planting and rows of this palm present the appearance of the nave and aisles of a Gothic Cathedral, the arched leaves meeting overhead and producing an imitation of vaulted roofs.

Quite a number of specimens of this beautiful palm are in cultivation in Honolulu, mostly in private grounds. The tallest ones occur in Mrs. Foster's premises formerly belonging to the late Dr. Wm. Hillebrand, who introduced a great majority of our ornamental plants, and is probably responsible for the presence of this species in Honolulu.

Cocos nucifera L.

COCONUT PALM. NIU.

Though the *Coconut* is indigenous to Hawaii, it is such a landmark in these Islands that it must be considered, even if not within the scope of this work.

The centers of distribution and geographical range are the Islands and countries bordering the Indian and Pacific oceans. The Asiatics and Polynesians have discovered a number of uses to which it may be put which would indicate that they must have been familiar with it from time immemorial. The coconut tree attains a height of



Cocos plumosa Hook.

Feathery Coco-Palm, Government Nursery, Young Street.

nearly a hundred feet, and the gracefully leaning trunk crowned by the numerous feathery leaves gives a splendid effect. It favors the sandy shores and does not only endure salt and salt water but practically requires it, the salt taking the place of fertilizer. While it has been employed by the natives of nearly all countries to which it is indigenous, the Hawaiians did not employ it extensively.

In Hawaii the *Coconut* does not grow to such luxuriance as in the Islands of the South Pacific where the atmosphere is much more humid and rains are more frequent. The *Coconut Palm* has many enemies in Hawaii and one of the most detrimental is the coconut leaf roller, to which is due the dilapidated appearance of the leaves. Numerous varieties of coconuts are in cultivation and one with rather large nuts, known in Honolulu as the Samoan Coconut, produces a very short trunk with the nuts almost lying on the ground.

While in other tropical countries the copra industry is carried on at a profit, in Hawaii the number of trees is not sufficient to warrant the collecting of the nuts for copra, and it may seem strange to state that the writer has bought coconuts in Europe cheaper than here in Hawaii.

Copra is nothing but the dried kernel of the coconut, which is manufactured into soap, butter and oil, about two quarts of oil being procured from fourteen or fifteen coconuts. The home of the coconut is not known. Some contend that it originated on the shores of the Indian Ocean and others that it is a native of America, the former theory seems to be much better justified.

***Cocos plumosa* Hook.**

THE FEATHERY COCOPALM.

Plate XXIV.

Cocos plumosa is an exceedingly handsome species, with a straight trunk of medium height. The leaves are pinnate, feathery, ascending, and arch gracefully; the segments are long and narrow and of a dark green. The flowers are borne in a drooping spadix. The fruits are ovate, pointed, and about an inch long. *Cocos plumosa* which lends itself well to street planting is quite a hardy palm; it is a native of South America, as are most of its congeners which have, however, been taken out of the genus *Cocos* by Dr. O. Beccari and placed into new genera, the names of which served as subgeneric ones under *Cocos*. What was known as *Cocos Romanzoffiana* Cham., is now



Cocos Romanzoffiana Cham.

On Vineyard Street.

Arceastrum Romanzoffianum (Cham.). Becc. Of this latter species a number of specimens occur about Honolulu, one on Vineyard Street; one on Kamehameha Avenue in Manoa Valley, to the left of car line switch, and a few but rather poor specimens in Kapiolani Park. See Plate XXV.

Both species are natives of Brazil. Besides these two *Cocos* there are two or three other species in cultivation with pinnate, glaucous leaves; their identity is however not established. They have been introduced by Mr. Jordan and are now growing (quite mature specimens) in his premises on Wyllie Street, Nuuanu Valley. In the grounds of Lunalilo Home occurs a species with globose, yellowish-pink, edible fruits, which must be referred to *Cocos odorata* Rodr.

CYCLANTHACEAE

Of the Family *Cyclanthaceae*, a close congener and relative of the Palm family, which it resembles or equals, in the vegetative organs, but allied to the Aroids in its reproductive organs, the genus *Carludovica* is represented only by a single species, *Carludovica palmata* Ruiz. et Pav. the Panama Hat Plant, usually considered a palm by the layman. It is a stemless plant, a native of Peru, but now cultivated for commercial purposes, the well known Panama hats being manufactured from the leaves. Specimens may be seen in Mrs. E. A. Jaeger's premises near the entrance. Mention may be made of the family *Araccae* or Taro family of which several ornamental species are under cultivation. The climber with large golden-yellow and green leaves which are so frequently seen ascending the trunks of Royal Palms and Algaroba trees is *Scindapsus aureus* (Lindl. et Andre) Engl., others are species of *Philodendron*, *Raphidophora*, and *Syngonium podophyllum* Schott. with five to seven pinnatisect leaves.

Monstera deliciosa Liebm. a huge climber with large perforated leaves and edible fruits is a native of Mexico, and is not uncommon in the Islands.

MUSACEAE

BANANA FAMILY.

This family is represented by three genera, *Musa*, *Ravenala*, and *Strelitzia*. To the first belong the different species and varieties of Bananas, of which *Musa Cavendishii* Lamb, the Chinese Banana is the most commonly cultivated. This banana is rather short stemmed



Ravenala madagascariensis Sonn.

Traveler's Trees in the Royal Hawaiian Hotel Grounds

and is cultivated by the Chinese in Honolulu; a small plantation can be seen in the swamps along Kalakaua Avenue opposite the Seaside Hotel. The Brazilian Banana, a tall plant, can be found usually near dwelling places. For further reference in regard to Bananas see: Gerrit P. Wilder, "Fruits of the Hawaiian Islands."

The Genus *Strelitzia* is represented by the cultivated species *Reginae* from South Africa, in a few places in Honolulu as Mrs. Foster's and Mrs. Jaeger's premises, the former on Nuuanu Avenue, the latter on corner of King and Punahou Streets. The genus *Ravenala*, however, is of the greatest interest, and is here treated separately. *Heliconia metallica* is also present.

***Ravenala madagascariensis* Sonn.**

TRAVELLER'S PALM, OR TRAVELLER'S TREE.

Plate XXVI.

The Traveller's Tree or Palm, as it is often erroneously called, belongs to the Banana family and has nothing in common with the palms. It is a unique and striking-looking tree and reaches a height of often forty to fifty feet. As its specific name implies, it is a native of Madagascar. Another species of this genus occurs only in Brazil and Guiana, South America.

The Traveller's Tree has been in cultivation for several decades, and a few handsome specimens can be found in various gardens and residential grounds about Honolulu. It is remarkable for the arrangement of the leaves, which resemble a huge fan. The leaves are often twelve to fifteen feet in length but are more or less torn into ribbons like those of the Bananas when planted in exposed situations. The name Traveller's Tree has been given it on account of its supposed service to travellers in the forest region and deserts, it being capable of storing water in the leaf sheaths near the base where they join the stem. There seems not to be any need, however, for using this usually putrid water, as the tree grows in regions where water is usually plentiful.

The leaves are used in Madagascar for roofs and packing material, while the split leaf stalks and leaf midribs serve for thatching; they are braided together and employed as doors, and the huts of the natives are often constructed altogether from the braided leaf stalks. The plant is propagated from seed as well as from root suckers; it loves a moist, hot climate, and is quite ornamental.

Plate XXVII.



An avenue of *Casuarina equisetifolia* Stickm. in Kapiolani Park.

SUBCLASS DICOTYLEDONES.

Plants belonging to this subclass have a more complex stem-structure, the fibrovascular system being arranged in concentric layers; these are divided into medullary rays which radiate from a central column called the pith. By far the greatest number of plants belong to this subclass.

CASUARINACEAE

Casuarina equisetifolia Stickman.

IRONWOOD.

Plate XXVII.

The *Ironwood* is a large, rapid-growing, evergreen tree, with leafless branches which are drooping, cylindrical, and have sheaths of awl-shaped scales at the joints. They are deciduous and take the place and perform the functions of leaves. It has the appearance of a pine. The branches are jointed like an *equisetum* stem, hence the name.

The genus *Casuarina*, named on account of the pendant branchlets, resembling the feathers of the Cassowary, was formerly classed with the conifers, but is now recognized as the only known genus of a distinct family.

The tree, which is planted as wind-breaks and is especially common near the seashore at Waikiki and Kapiolani Park, attains a very large size and diameter of trunk; it loves the sandy tracts near the sea and forms on some of the South Pacific Islands the greater portion of the strand forests of which the Hawaiian Islands are so devoid. The tree is of very wide distribution, ranging from Australia to the Malayan Islands, India and the islands of the Pacific. It is now cultivated in many tropical or subtropical countries and can be found in Florida, California, and parts of South America. Nice avenues of this tree, one of which is here figured, can be found in Kapiolani Park at Waikiki, while single trees can often be seen on residential premises.

The bark of the Ironwood is used in tanning, and a brown dye is extracted from it. It is slightly astringent and is used as a tonic in infusions, as well as being useful in treating chronic dysentery.

The wood is exceedingly hard; it cracks and splits, however, and is difficult to cut. As firewood it serves well, as it burns readily and the ashes retain the heat for a long time. In Fiji the natives use the

wood for tapa beaters, while the Australian aborigines make war clubs from it. It is of a light brown color, close-grained and prettily marked.

Besides this species there is one other cultivated in the Territory, *C. quadrivalvis*, an upland species mainly planted along the Pali road—a continuation of Nuuanu Avenue. In Australia the latter tree is known as He Oak and Beef Wood.

MORACEAE

MULBERRY FAMILY.

The Mulberry family is represented in the Islands by several introduced genera of which the genus *Ficus* is the predominant one. Mention may be made of *Morus nigra* L., the black mulberry, which has been in cultivation here for decades.

The species of *Ficus*, represented by cultivated ones only, are quite numerous in and about Honolulu and elsewhere in the Territory. There are also species of *Castilloa* under cultivation, *Castilloa elastica* Cerv. and another species from Nicaragua.

Of the genus *Artocarpus* several varieties of *Artocarpus communis* Forst., the common Breadfruit and *Artocarpus integrifolia* the Jak-fruit are commonly met with.

The plants of ornamental value which concern us most, however, belong to the genus *Ficus*.

Ficus elastica Roxb.

INDIA RUBBER TREE.

The *India Rubber Tree*, cultivated as a pot plant in many temperate climates, when planted out in the tropics, reaches a height of forty or more feet, is glabrous throughout, and has a spreading crown. It begins life as an epiphyte, sending down adventitious roots from the trunk and larger branches. The leaves are leathery, smooth and shining. The tree is easily recognized by the pink or red stipules which enclose the young leaves. It is a native of India but has been in cultivation practically throughout the civilized world, even in the northern parts of Europe and America, where it is used for room decorations.

In its native home it grows in the damp forests from the base of the Himalayas in Sikkim to Assam and Arracan. It is also frequent in Upper Burmah where it is said that whole forests of it exist.

The tree yields the Caoutchouc of Indian commerce. In Hono-

lulu scattered specimens may be found, several good specimens occurring on Kalakaua Avenue near the Moana Hotel and Royal Grove.

***Ficus bengalensis* L.**

BANYAN TREE.

Plate XXVIII.

Ficus bengalensis not to be mistaken for *Ficus indica*, a much smaller tree of thirty feet in height, and growing erect, is a large tree attaining a height of seventy to one hundred feet, sending down roots from its branches and thus expanding horizontally. Like other species of *Ficus* it begins life as an epiphyte, the fruits being carried by birds into the branches of other trees and there the seeds germinate, later on dealing death to the host.

The side branches of the *Banyan* reach often such thickness that they finally become auxiliary trunks and the forest-like expansion continues sometimes over an acre, sufficient to afford shade for many thousand people.

Enormous specimens exist in India, its native home. One is spoken of as having a circumference of two thousand feet and as able to give shade to 20,000 people.

It is reported as one of the greatest enemies to buildings, especially in Bengal; the seeds contained in bird droppings germinate on the walls of houses and temples.

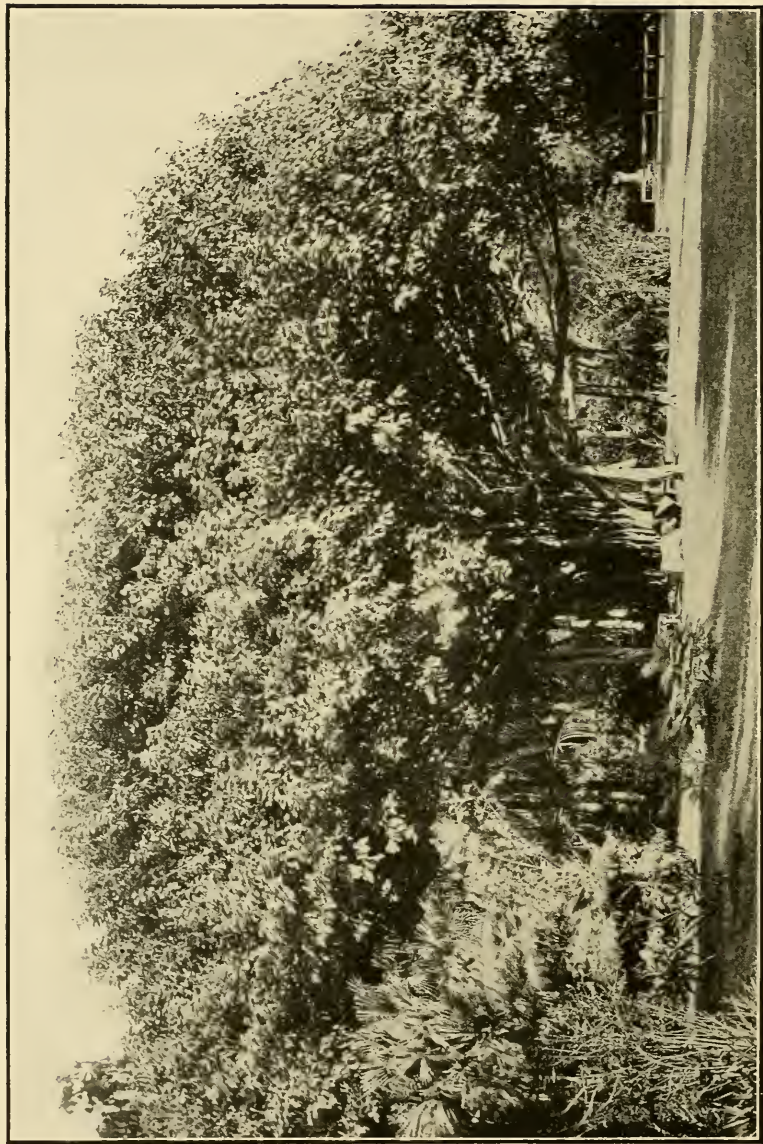
It grows wild in the sub-Himalayan tracts and the lower slopes of the Deccan but has been planted in many tropical countries. In Honolulu numerous specimens occur, some of the finest in the late Mr. Cleghorn's garden at Waikiki and in Kapiolani Park. Others may be seen on Beretania Street near Punahou, and elsewhere.

The name *Banyan* was first given this tree at a place called Gombroon in India where Hindu traders called *Banyans* had settled and had built a *pagoda*.

The French traveler, Tavernier, speaks of it as the *Banyan's* tree; others state that it was a favorite tree of the *Banyans* or Hindu traders.

It is a favorite roadside tree and should be planted as such along country roads where shade is required.

The *Banyan* yields an inferior rubber of no commercial value, while the red figs are eaten in India by the poorer classes, especially in times of famine. The milky juice is employed medicinally by the natives of India and is used externally for bruises and as an anodyne



Ficus bengalensis Linn.
The Banyan, at Aieahou, Waikiki.

application in lumbago and rheumatism, and in Lahore the milky juice has been employed to aid in the oxidation of copper.

The Hindus consider the *banyan* to be sacred and state that Brahma was transformed into a *Vada* tree, *Vada* being one of the vernacular names of this tree in India. The Hindus regard it a sin to destroy a Banyan; women are ordered to worship it on a certain day of the year (May 15th, the *Jesht shudh*), and are told that by doing so they attain one of the heavens.

In Honolulu the tree is badly infested by scale insects which are followed by a black fungus (*Capnodium lanosum*) giving the tree an ungainly appearance.

Ficus religiosa L.

THE PEEPUL TREE.

The *Peepul* is a large glabrous usually epiphytic tree with long petioled, ovate, rounded leaves the apex of which tapers into a linear-lanceolate prolonged acumen. The fruit is borne sessile, is dark purple and has broad leathery basal bracts.

The Peepul is a native of the sub-Himalayan tracts but is cultivated throughout India as high as 5,000 feet elevation but rare in the arid regions of Northwestern India. In Honolulu it is not so commonly planted as the Banyan but fine specimens may be seen at Moanalua Gardens, and in private grounds and parks about Honolulu. It is well suited for avenues. It is declared sacred by the Hindus and Buddhists, the former viewing it as the female to the Banyan. It is worshipped and vows are made to it. The Buddhists believe that the incarnation of Buddha took place under this tree, and that he received the Buddhahood under the famous sacred Peepul at Bodhgaya in India not far from Benares.

Ficus benjamina L.

CHINESE BANYAN.

The so-called *Chinese Banyan* is of much smaller stature than the Bengal or Indian Banyan, reaching a height thirty to forty-five feet, it too is epiphytic and assumes tree form. Its branches are long and drooping. The leaves are leathery, oblong-ovate, quite smooth, pointed at the apex and rounded at the base. The fruits are axillary, solitary and sessile, of a dark purple color, fleshy when mature, about a half an inch or less in diameter. It occurs wild along the base of the eastern Himalayas to Assam, Burmah and the Andaman Islands.

Plate XXIX.



Showing the surface root system of *Ficus benjamina* in Mrs. M. E. Foster's grounds, Niuanu Avenue.

It is cultivated in the Malay peninsula, the Philippines and also in Honolulu, where quite a number of specimens can be found. Four are at Thomas Square Park, others in residential grounds around the city and in other public parks. The wood of this tree is of a gray color, beautifully mottled, and is moderately hard.

Numerous other species of *Ficus* are under cultivation in Honolulu the most noteworthy being the ordinary Smyrna fig *Ficus carica* L., *Ficus Rumphii* Blume, a species greatly resembling the Peepul, but with leaves much less caudately acuminate, represented by a single specimen cultivated at Mrs. Mary E. Foster's premises; in the same locality is a specimen of *Ficus hispida* L. a native of the Himalayas but of wide distribution ranging over China to Australia.

Ficus parcelli Hort. a horticultural species with variegated, yellow mottled leaves occurs in the former premises of W. M. Giffard, while *Ficus heterophylla* L. a pubescent creeper, becoming a shrub, if unmolested, is very common, usually trained over walls of buildings. It is a polymorphous species whose leaves are in general small, but become of large size on lateral branches, on which are borne the large pear-shaped dry figs. It has to be kept down or else will grow into a big shrub. A single specimen of *Ficus infectoria* Roxb. with thin, papery leaves on long petioles, with small, pinkish figs, occurs in Dr. W. Hillebrand's grounds.

Other species not yet determined are also under cultivation in Honolulu.

PROTEACEAE

The family *Proteaceae* is represented by the cultivated species of *Grevillea robusta* A. Cunn. and *G. Banksii* R. Br. both of Australia. Another valuable tree is *Macadamia ternifolia* known as the Macadamia nut tree. The latter is extensively cultivated by Mr. Jordan on his grounds in Nuuanu, while other specimens are scattered about Honolulu. An accessible specimen occurs at the Government Nursery on King Street.

Grevillea robusta A. Cunn.

THE SILKY OAK.

The genus *Grevillea* is quite large, approaching two hundred species, nearly all of which are peculiar to Australia, only a few occurring in New Caledonia. In Honolulu there are about three species in cultivation, the Silky Oak and two shrubs, one with bright red the other with whitish yellow flowers.

The Silky Oak, which is a large tree, in fact the largest in the genus, may be seen planted along roadsides, as on Young Street behind the quarters of the Board of Agriculture, and along various other streets in Honolulu. It often reaches a height of eighty to one hundred feet, and is quite robust, whence its specific name. The generic name refers to the Right Hon. C. F. Greville, a patron of botany in the beginning of the Nineteenth Century.

The leaves are pinnate, graceful and fern-like, six to eight inches long and silky underneath; the tree bears a profusion of orange-yellow flowers on racemes which are solitary or several on short leafless branches. The follicle (a fruit of one carpel) is somewhat leathery, opens in two valves and encloses a winged seed which is extremely light, and as the trees are usually quite lofty it is difficult to collect the seeds, which are blown about by the wind as soon as the follicles open.

The timber of the Silky Oak is light in color but has handsome oak-like markings. It has been employed for wine casks, but seems to be too porous to hold spirits. It was formerly used in Australia for milk buckets and other dairy utensils, and has now come into use again for butter boxes.

The trunk gives off an exudation of both gum and resin which is of a peculiar yellow color and has a very disagreeable odor.

The Silky Oak is a native of Queensland, where it occurs in the brush forest, but not many miles from the coast. It is quite drought-resistant, and has on that account been cultivated and planted extensively in many tropical countries. Its tenacious vitality, quick growth, hardiness and value of timber make it a desirable tree. In this Territory it flourishes from sea-level to four thousand feet elevation on Haleakala, Maui, and is not at all particular in regard to climate. Owing to its being deciduous or rather semi-deciduous it is not well suited for street planting, and as its appearance is not altogether graceful it should not be used for avenues, but should be planted where wind-break is required or for other utilitarian rather than ornamental purposes.

Grevillea Banksii R. Br., which is a tall shrub or slender tree fifteen to twenty feet in height, has red flowers, is much smaller than the *Grevillea robusta*, and indeed worthy of cultivation. It is indigenous to Queensland.

POLYGONACEAE

The family *Polygonaceae* is represented by two genera and in turn each genus by one species. *Coccoloba uvifera* Jacq., the *Sea grape* or *Pigeon wood*, is a tree of medium or large size and grows near the sea in the West Indies. In Jamaica the wood is esteemed for cabinet work. It is propagated by cuttings. A specimen may be seen in Mr. Jordan's grounds on Wyllie Street, Nuuanu.

Muehlenbeckia platyclada Meissn. is a shrub, often climbing, with phyllodic branches resembling the broad, flat Hawaiian Mistletoe, and fleshy leaves which it throws off soon after their appearance. It is a native of the Solomon Islands, and is sparingly cultivated in Honolulu. To this family belongs also the *Mexican Creeper* *Antigonon leptopus* H. et A. a native of West Mexico and commonly cultivated in Honolulu, where only the red variety is seen.

NYCTAGINACEAE

No introduced arborescent species of this family are to be found in Honolulu or elsewhere in the Territory but there are several climbers of great beauty which cannot well be omitted. The genus *Bougainvillea* named after De Bougainville, a French navigator, comprises the well known climbers.

Bougainvillea spectabilis Willd. is the most commonly cultivated species, the floral bracts being either purple, red or brick red, the latter is horticulturally known as var. *lateritia* Hort.; the small flowered everblooming variety is botanically known as *B. spectabilis* Willd. var. *parviflora* Mart.

Bougainvillea glabra Choisy a perfectly glabrous species with rose-red bracts is also in cultivation. It differs from *B. spectabilis* Willd. in the branches and leaves, which are perfectly glabrous, in the lanceolate leaves and elliptical-lanceolate bracts.

Of the Family *Amaranthaceae* the following may be mentioned but does not come within the scope of this work: *Alternanthera versicolor* Regel, a small border plant with variegated leaves, a native probably of Brazil.

MAGNOLIACEAE

MAGNOLIA FAMILY.

The *Magnolia* Family is represented by the two introduced genera, *Michelia* and *Magnolia*. Of the former, two species are in cultivation, *M. champaca* L. and *M. fuscata* Blume, of the later *Magnolia grandiflora* L. only. *Michelia champaca* L. is a small tree with pubescent branches and ovate-lanceolate leaves; the flowers are yellowish, waxy, and exceedingly fragrant. It is a native of India and is known in Honolulu as *Mulang*. Specimens may be seen in Mrs. M. E. Foster's premises. The second species, *M. fuscata* Blume, is a shrub with the young shoots brown-pubescent; the flowers are small, erect, and brownish, and also very fragrant. It is a native of China, and specimens may be seen on the above-mentioned premises.

The *Magnolia* does not grow so luxuriantly as in the southern United States, but remains stunted, barely reaching a height of fifteen or twenty feet. It grows better in the uplands, as on Maui on the slopes of Haleakala, where it is in cultivation.

ANONACEAE

The *Anona* family is distributed exclusively in the tropics, especially within those of Asia, Africa and America. In Honolulu a number of genera are under cultivation. The genus *Anona* is well represented by the edible species *Anona muricata* L. the Soursop, *A. squamosa* L. the Sugar Apple, *A. Cherimolia* Mill., the Cherimolia, and *A. reticulata* L., known as Bullock's Heart or Custard Apple. All four species are of South American origin, but are cultivated for their fruits practically throughout the tropics. Of the genus *Polyalthia* there is one species in Honolulu grown in Queen's Hospital grounds. It is a small tree or shrub with small dark purple globose fruits, erroneously recorded by G. P. Wilder as *Bumelia* Sp. in his book on the "Fruits of the Hawaiian Islands," plate 117.

Canangium odoratum (Lam.) Baill.

(Syn. CANANGA ODORATA Hk. f. et Th.)

ILANG ILANG.

The *Ilang ilang* is a medium-sized to rather large tree with drooping branches; the leaves are oblong-ovate with a pointed apex and usually rounded base and are five to eight inches long. The flowers, which are greenish and very fragrant, are pendulous and turn yellow

when mature, the flowerstalks are elongated when in fruit, the petals are lanceolate, one and one-half inches long and one-third inch wide. The fleshy fruit is oblong-cylindrical, green or the color of a ripe olive, and little less than an inch long.

The *Ilang ilang* is a native of Burmah, Java, Tenasserim and the Philippines, but has been in cultivation in many parts of India and other tropical countries on account of its sweet-smelling flowers. In Honolulu the tree is not uncommon, and may be found in a great many private grounds as well as in the Government Nursery and a few public parks.

An oil prepared from the flowers is known as *Otto of Ilang* and is highly esteemed. The flowers are distilled in large quantities for the valuable perfume oil which is frequently blended with pimento, rose, tuberose and jasmine in the preparation of handkerchief perfumes.

The wood of the *Ilang ilang* is soft and white, and not very durable. The Samoans make small canoes of it, while the Malaysians hollow out the trunks into drums or tomtoms. The flowers are often strung into wreaths and garlands by the South Sea Islanders. The tree may be readily propagated from cuttings or seeds; it thrives well in moist warm climates, and flowers and fruits all the year round.

The oil of the *Ilang ilang*, valuable as a perfume oil, is exported from the Philippines in steadily increasing quantities, amounting in value to over one hundred thousand dollars annually.

Artabotrys uncinatus (L.) Merrill, also known as *Ilang-ilang*, is a scandent woody shrub, glabrous throughout. The flowers are fragrant, solitary or in pairs. The ripe fruit is about 2 inches long, obovoid and yellow. It is a native of India and Ceylon, but is now cultivated in many tropical countries. In Honolulu it is trained into arbors and made to climb over trees and verandas. Specimens may be seen in Dr. Cooper's premises opposite the Normal School and also on Wilder Avenue. The odor of the strongly scented flowers reminds one very much of that of *Canarium odoratum*.

MYRISTICACEAE

Of the *Myristicaceae* or Nutmeg Family, the Nutmeg, *Myristica fragrans* Houtt. is the only member cultivated in Honolulu. In fact there is only one single male tree to be found; it grows in Mrs. M. E. Foster's premises and was introduced by Dr. W. Hillebrand.

LAURACEAE

LAUREL FAMILY.

The *Laurel Family* is distributed over the warmer parts of both hemispheres, but is chiefly tropical. In Honolulu there are under cultivation two genera, *Cinnamomum* and *Persea*; the first, more definitely described below, is represented by two species, the Cinnamon and Camphor tree, the latter by one species, *Persea americana* Mill., the well-known Alligator Pear or Avocado, a native of tropical America. It has been planted in most tropical and subtropical countries on account of its highly prized fruit.

***Cinnamomum zeylanicum* (L.) Bl.**

TRUE CINNAMON.

The *True Cinnamon* is a tree of medium height and is glabrous, with the exception of the finely silky-pubescent buds. The leaves are leathery and shining, oval in outline and are strongly three- to five-nerved. The flowers, which are pale yellow, are borne numerously on panicles of the length of the leaves, clustered in the upper axils. The fruit is less than half an inch long, oblong ovoid, slightly fleshy and is surrounded by the enlarged perianth. The *True Cinnamon* is a native of the forests of Ceylon, but is now cultivated on that island as well as in Southern India.

Various products are derived from the Cinnamon tree, which are commercially exploited. For instance, the root of the tree yields camphor, while of the fibre or inner bark an essential oil is procured which is of considerable importance. Cinnamon is exported from Ceylon in the form of sticks about 40 inches long, formed of tubular pieces of bark about a foot long, and one placed within the other dexteriously. The bark composing the stick is extremely thin and has a light brown dull surface with a fragrant odor quite peculiar to this species and allied barks of the same genus.

Medicinally, cinnamon, which is aromatic and stimulant, is used in spasmodic affections of the bowels and gastric irritation.

A volatile oil is distilled from the leaves known as "clove oil," similar to the genuine oil of cloves, and used in toothache.

The only mature specimens known to the writer are on the premises of the late Dr. Wm. Hillebrand, who is responsible for its introduction. The trees, which are of considerable height, bear seed profusely, young seedlings coming up under the trees at all times.

Another species of this genus *Cinnamomum camphora* Nees, the Camphor Tree, reaches quite large dimensions; it has smooth shining leaves, which when crushed emit a strong odor of camphor. It is a native of China, Japan and the Malay Islands and is of early introduction. Quite a number of trees can be found scattered throughout the Territory. Large specimens may be seen in the Royal Mausoleum grounds on Nuuanu Avenue near the entrance; others occur on Maui, Hawaii and probably elsewhere in the Territory, where it has been under cultivation for many years.

HERNANDIACEAE

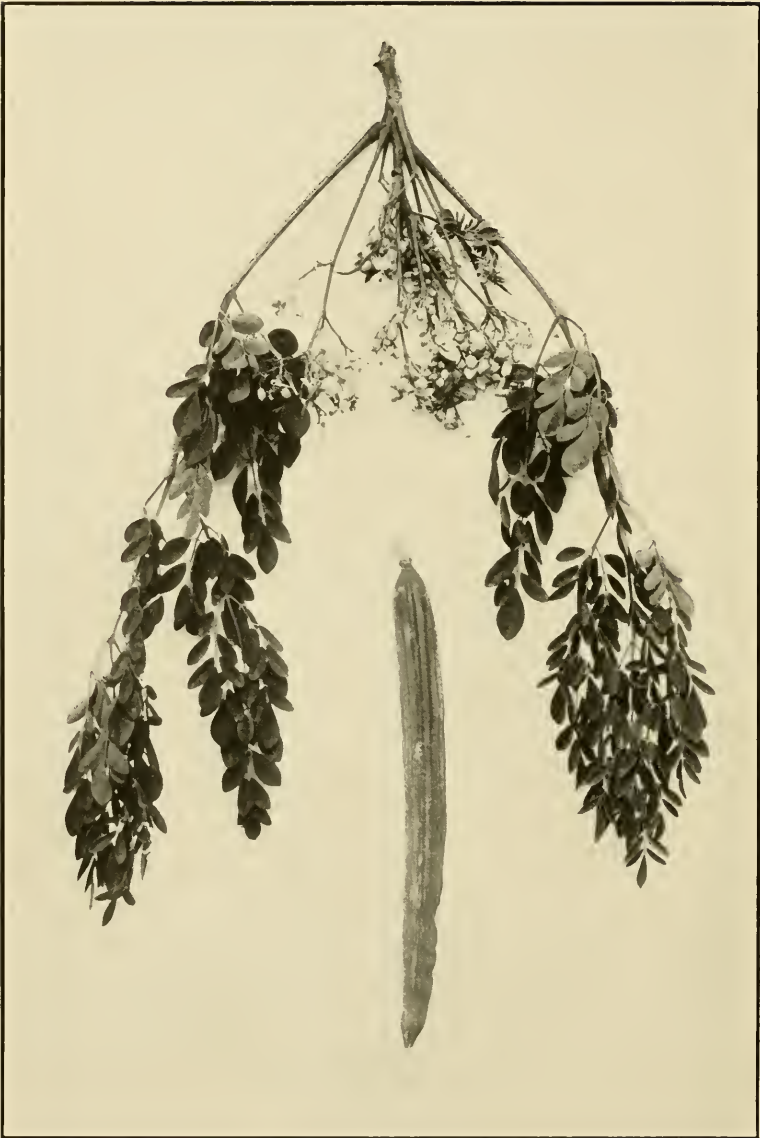
This family is represented by the following species only:

***Hernandia peltata* Meissn.**

Hernandia peltata is a large spreading tree with thick, bright green, broadly ovate pointed leaves, which are peltately attached near the base, the larger ones being nearly a foot long. The flowering panicles are shorter than the leaves, and the flowers are almost clustered on the branches; the female flowers are terminal, with one or two male flowers lower down. The fruit is completely enclosed with the involucre which becomes inflated globular and fleshy, with a circular entire orifice at the top; the fruit is about an inch in diameter and marked with eight broad, raised, longitudinal ribs. The seeds are very hard, and are about three-fourths of an inch in diameter.

This evergreen tree is a native of Southeast Asia, the South Pacific, Mascarene and Philippine Islands, Guam and Loo Choo Island, besides occurring also in Queensland, Australia, in all of which countries it grows in the coast forest. The wood is very light, and takes fire readily from a flint and steel.

The juice is a powerful depilatory and removes hair without pain. The bark and leaves act as a cathartic. Very few trees are in cultivation in Honolulu. The largest specimen grows in the grounds of the Board of Agriculture on King Street. The author collected it on the shores of Guam, and young specimens have now been planted on the College grounds.



Moringa oleifera Lam.

Horse-radish Tree.
Flowering specimen and fruit.

Hernandia bivalvis Benth.

Hernandia bivalvis is a small tree with ovate-lanceolate, pointed leaves which are not peltate at the base. The inflorescence is as in *H. peltata*. The involucre, which is very large and encloses the fruit, is not simple but bi-valved, consisting of two inflated, almost membranous, valves which are cordate at the base. The fruit is about ten-ribbed and the seed is as in the other species. It is a native of Queensland, Australia. Only one single tree occurs in Honolulu; it can be found on the grounds of the Government Nursery, near the Young Street side.

MORINGACEAE

Moringa oleifera Lam.

HORSE-RADISH TREE.

Plate XXX.

The *Horse-radish Tree* is of medium height, never more than twenty-five feet, has a corky bark, and roots with a pungent taste. The leaves are pinnate, pale beneath, and thin. The white flowers are borne in spreading panicles. The pod is pendulous, three-angled, and ribbed; the seeds are also triquetrous and winged on the angles. The tree, though widely distributed in the tropics, is a native of Asia, occurring in the Himalayan tracts but is commonly cultivated in India, Burmah, and in some parts of Africa, especially in Togo, where it is planted from cuttings as a hedge. The seeds yield a rather clear, colorless oil, which is easily extracted by means of pressure. It is composed of olein, margarine and stearine, and is considered one of the best lubricants for fine machinery and is especially valued by watch-makers, but is also used for the manufacture of perfumed hair-oil, owing to its great power of absorbing and retaining the most fugitive odors.

In India, flowers, leaves, and pods are cooked in various ways as a pot-herb, while the root is used as a condiment. The roots of young trees when scraped resemble horse-radish, and taste so much like it that the nicest palate could not distinguish the two. There are probably not more than three mature specimens of this tree in the Territory. The writer understands that a number of young plants have been raised from seed at Kahana by Mr. Leckenby. The one which is in Dr. W. Hillebrand's garden is probably the first specimen introduced.

LEGUMINOSAE

LEGUME OR BEAN FAMILY.

The vast Legume or Bean Family is represented in the Hawaiian Islands by many introduced as well as native species; the introduced species are much more numerous than the indigenous or native ones which have been treated in the writer's book, "The Indigenous Trees of the Hawaiian Islands." In the present volume only such of the introduced species are discussed or figured as are of arborescent character and of more or less ornamental value.

The family Leguminosae is divided into three very natural sub-families as follows: *Mimosoideae* with regular flowers, valvate petals, and definite or indefinite stamens; *Caesalpinioideae* with irregular flowers, petals imbricate, the upper petal innermost, sometimes reduced to one or three and definite stamens; *Papilionatae* with very irregular petals, the flower butterfly-like, the upper petal outermost; the stamens definite, their filaments variously united. All three divisions have the characteristic pod or legume which may be dry or fleshy, dehiscent or indehiscent, and is variably one to many-seeded. Among the numerous species found in and about Honolulu the following less conspicuous members are only mentioned here, as space forbids going into detail.

In the *Mimosoideae* group belong the common *Klu* or *Aroma*, *Acacia Farnesiana* (L.) Willd., a much branched spiny shrub or small tree with fragrant globose, yellow flower heads. It grows in common with the *Algaroba* and frequents the arid regions. It is a native of tropical America. Mention may also be made of the two Australian wattles *Acacia decurrens* and *Acacia dealbata* both planted on Tantalus, as well as *Acacia catechu*. *Albizia lebbekoides* is rare in Honolulu, the writer knowing only of one tree, in Mrs. Foster's grounds on Nuuanu Avenue; it has finely pinnate leaves and narrow thin papery pods. *Albizia stipulata*, recognizable by its large conspicuous stipules, may be found in the Government Nursery grounds on King Street. *Parkinsonia aculeata*, an undesirable very spiny shrub, is of later introduction and was first planted by the army along the waterfront. *Leucaena glauca*, the *Koa haole* of the natives, is an introduced shrub more often a weed with rather large globose, white flower heads, found on the lower mountain slopes and waste places. Of the *Caesalpinioideae* may be found *Intsia bijuga* (Colebr.) O. Kuntze, a native of tropical Madagascar and Polynesia; only one tree is known to the writer, growing in Hilo at St. Mary's School. To the *Papilionatae* belong the following species:



Cassia nodosa Ham.
Pink and White Shower

After a painting by W. R. R. Potter

Dalbergia sissoa Roxb., a handsome tree of which a single specimen occurs in Honolulu on King Street in the Government Nursery. *Clitorea ternatea* Lam. a scandent vine with blue flowers is not uncommon. *Gliricidia sepium* (Jacq.) Steud. was first introduced by Mr. and Mrs. F. M. Swanzy from the Philippines and may still be seen growing on their premises facing Manoa Valley Road. In the Philippines it is a very handsome shrub or small tree, but it has not become acclimated in Hawaii. Mention may be made of two handsome trees; the one with yellow flowers and flat papery pod with one seed is *Platymiscium floribundum*, a native of South America, the other with purplish red flowers arranged in dense axillary racemes, belongs to the genus *Lonchocarpus* and is probably a native of Africa. Both these species, of each of which there is only a single tree, have been introduced by Dr. William Hillebrand and can be found in his old premises now belonging to Mrs. Mary E. Foster, on Nuuanu Avenue.

A number of Leguminous trees have been imported by the writer lately and especial mention may be made of the king of flowering trees, *Amherstia nobilis*, which he brought from Java, as well as species of *Brownea* (*grandiceps* and *hybrida*) *Saraca declinata*, several species of *Bauhinia*, *Schizolobium excelsum*, *Parkia Timoriana* and *Pahudia rhomboidea* the latter two from the Philippines. Seeds of numerous leguminous trees were also imported which have germinated and may be expected to become established.

Key to the Subfamilies

- Flowers regular, petals valvate; stamens definite or indefinite,
 I. *Mimosoideae*.
 Flowers irregular, upper petal innermost, petals imbricate, sometimes reduced to one or three; stamens definite.....II. *Caesalpinioideae*.
 Petals very irregular, butterfly-like, upper petal outermost, stamens definite, their filaments variously united.....III. *Papilionatae*.

Enterolobium cyclocarpum Grieseb.

ELEPHANT'S EAR.

Plate XXXI.

Enterolobium cyclocarpum Grieseb. is a lofty spreading tree, glabrous throughout. The leaves are pinnate and each pinna consists of twenty to thirty pairs of leaflets which are unequal-sided, oblong, pointed and glaucous beneath. The leafstalk bears glands between



Enterolobium cyclocarpum Grieseb.

Flowering and fruiting specimen.

the lowest and uppermost pinnae. The calyx is puberulous and more than half as long as the corolla. The numerous white stamens are united at the base. The pod is repand, forming a complete circle, the rounded top touching the rounded base, it is one and a half to nearly two inches broad with the basilar sinus closed. The whole fruit is consequently three to four inches in diameter. It is dark-brown and has a polished appearance.

This very quickly growing tree is quite common in Honolulu, where large specimens can be seen on King Street in Thomas Square, in the Government Nursery grounds and elsewhere. It deserves to be planted more commonly than heretofore owing to its quick growth and its value as a shade tree.

It is a native of Jamaica and Venezuela whence it was introduced into many tropical countries.

The bark of this tree contains tannin and the wood is used for building or construction purposes.

***Pithecolobium dulce* (Roxb.) Benth.**

OPIUMA (HAWAIIAN NAME). MANILA TAMARIND.

Plate XXXII.

The *Opiuma*, as the Hawaiians call the tree, is of medium height with a rather short trunk. The ultimate branches of the tree are pendulous and are armed with short, sharp spines; the leaves are two-pinnate—that is, each pinna consists of a single pair of leaflets; the flowers are white in dense globose heads and arranged along the slender branchlets; the dehiscent pod is twisted, often spiral, the valves turning red when ripe; it contains six to eight seeds which are surrounded by a whitish, sweet, edible pulp. The pods which ripen from April to June are good fodder for animals.

This tree yields a transparent gum of a polished appearance and a deep reddish brown color. This gum is soluble in water and forms a brownish mucilage. The seeds yield a fatty oil as thick as that of the castor bean, but its properties have not been determined. The sap wood is small, the heart wood is reddish brown and smells very unpleasant when freshly cut and is of little value; it is used for crates and packing boxes, and is also grown for fuel. It makes a good avenue tree, and is also suitable as a hedge plant. The bark contains about 25% of tannin and is one of the principal sources of that material in Mexico.



Pithecolobium dulce (Roxb.) Benth.
Opiuma, flowering and fruiting branch.

The *Opiuma* is a native of Central America and Mexico, whence it was introduced into the Islands many years ago.

The name *Pithecolobium* is derived from the Greek "monkey" and "pod" but has nothing to do with the tree known by the name *Monkey-pod* in Honolulu. The tree is now cultivated in other tropical countries, especially in India.

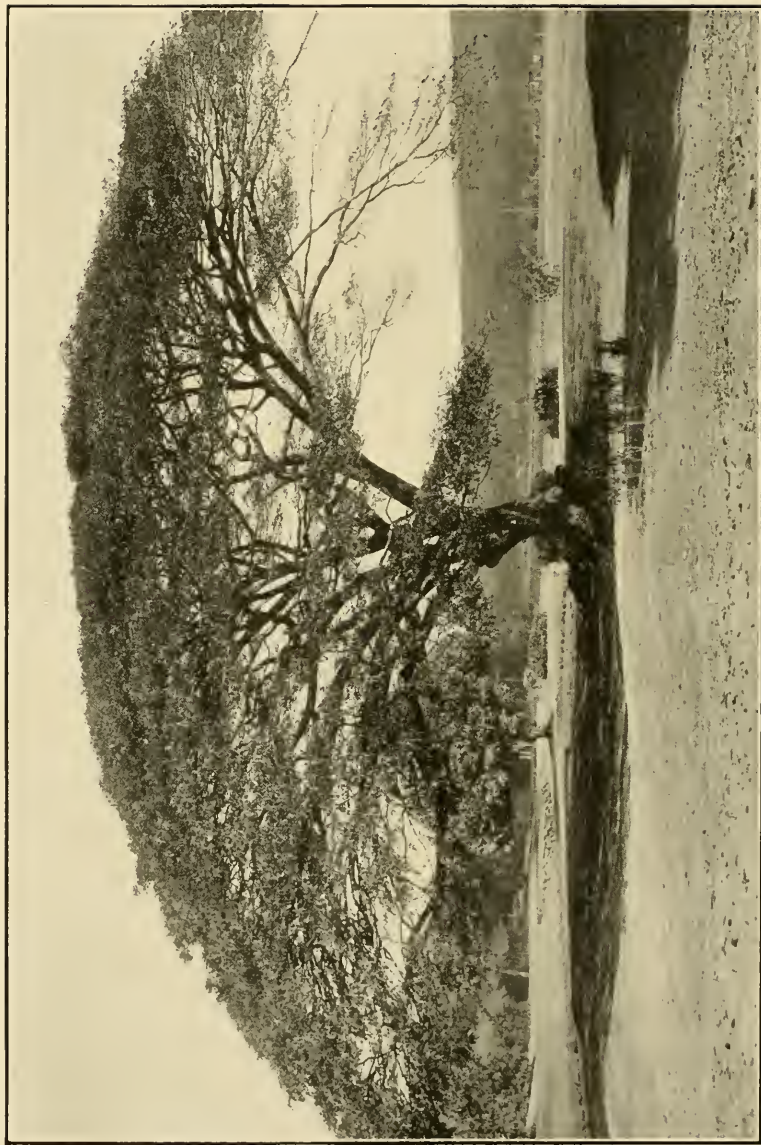
***Samanea saman* (Benth.) Merrill**

Plate XXXIII.

MONKEY-POD OR RAIN-TREE.

The *Monkey-pod* is a large tree reaching a height sixty to seventy-five feet, with wide-spreading branches. The leaves are evenly two-pinnate, pinnae eight to twelve, with twelve to sixteen leaflets in the upper, and six to ten in the lower, pinnae decreasing in size downward and are from three-fourths to one and three-fourths of an inch long. The flowers are pink and arranged in dense, peduncled, axillary heads. The pod is straight, somewhat fleshy and indehiscent. The mesocarp is pulpy and sweet. This species was formerly known as *Pithecolobium saman* but it has not the dehiscent twisted pod ascribed to this genus. Mr. E. D. Merrill, Government Botanist of the Bureau of Science in Manila, P. I., has thought best to establish a new genus for it adopting the section name *Samanea* under which it was listed in the former genus. The *Monkey-pod* yields a yellow gum of poor quality. The gum occurs in irregular drops and vermicular pieces, is soft and tough, and swells in water into a tough cartilaginous mass, which turns from a deep reddish brown color to black. The sapwood is white, while the heartwood is brown, rather soft and perishable; it weighs about twenty-six pounds per cubic foot. It is a native of the West Indies and Central America, but is now cultivated in most tropical countries. It is grown from seed. The *Monkey-pod* or *Rain-Tree* is a rapid grower, especially under irrigation. Its name *Rain-Tree* is probably derived from the falling liquid excreta of *cicadeae* insects which inhabit the trees in Central America. The name *Monkey-pod* is simply a translation of the old generic name *Pithecolobium*.

It is one of the finest shade trees and is on that account well adapted for street-planting, where shade is required. It is most extensively planted in the Islands; fine specimens may be seen on Punahou Street, at Moanalua Gardens, and elsewhere; some with a spread of over a hundred feet.



Samanea saman (Benth.) Merrill.

Monkey Pod or Rain-tree, growing in the Moanalua Gardens.

It is one of those trees in which the leaflets are possessed of the power of movement and close together at sundown, thus shedding the dew. When the sun is high the leaflets spread out and screen off the powerful rays of the sun. It is a valuable tree for crop protection as it prevents excessive evaporation from the soil.

Albizzia Lebbek (L.) Benth.

THE SIRIS TREE.

Plate XXXIV.

The *Siris Tree* is large, deciduous, and spreading. It is cultivated here and there in parks and along streets about Honolulu. The *Siris Tree* is a native of tropical Africa and Asia; it grows in the evergreen mixed forests in the lower Himalayas from the Indus to Bengal, Burmah, as well as in Central and South India, and often ascends to an elevation of five thousand feet. As the tree is deciduous and remains for a long time bare, save for the broad yellow papery pods which hang in great numbers and do not improve the appearance of the tree, it cannot be called ornamental; besides, its flowers are more or less inconspicuous, being of a greenish yellow color but are exceedingly fragrant. Even in the spring when the leaves appear, the pods, which are over half a foot long and an inch and a half wide, and straw colored, still remain.

It has been employed in India as an avenue tree, as its roots do not penetrate very deeply into the ground. It is grown from seeds but may also be easily propagated from cuttings. There are, however, much more desirable trees for avenue plantings which shed their leaves either not at all or at most for a very short period and besides have beautiful large showy flowers.

The *Siris Tree* yields a gum which is not soluble in water but is jelly-like and resembles gum arabic, and is often used as an adulterant for pure gum. The bark is used for tanning, while an oil extracted from the seeds is considered useful in leprosy. The seeds and leaves are employed medicinally in ophthalmia, and the flowers are used by the natives of India as a cooling medicine, being applied externally on boils and eruptions. Powdered seeds have been administered successfully in scrofulous enlargements of the glands, and powdered root-bark is used when the gums are ulcerated and spongy.

The *Siris Tree* is a rapid grower and is content with almost any kind of soil. It flourishes best, however, on embankments and roadsides. Large trees can be found in Honolulu, one at Pawaa Junction



Albizzia Lebbek (L.) Benth.

A large Siris Tree in Moanalua Gardens.

on King Street and others at Moanalua, while smaller ones are scattered all over town.

It has a large sapwood which is white, while the heartwood is dark brown, hard and somewhat mottled. It seasons well, is worked easily and takes a good polish. It is extensively used for various purposes, even for buildings, furniture, etc. In Northern India it is considered unlucky to use the wood in house-building.

***Albizzia saponaria* (Lour.) Bl.**

Plate XXXV.

Albizzia saponaria is a small tree attaining a height of thirty to forty feet. The leaves are twelve to sixteen inches long, and consist of four pinnae, the upper of which are longer than the lower and are composed of four to eight ovate leaflets, gradually becoming larger towards the end of the pinnae. The flowering panicles are terminal, pubescent and spreading. The flowers are white, crowded in heads at the ends of the branchlets. The pod is thin, flat, up to seven inches in length and little over an inch wide containing seven to twelve seeds.

It is a native of the Philippines, distributed over Malay and grows in the open forests. In Honolulu only a few specimens occur. The most accessible is in the Queen's Hospital grounds. The sapwood is of a creamy white, the heartwood dark brown to almost black. It is moderately hard and heavy and is used for general house construction in the Philippine Islands, also for furniture and fine interior finish in the southern islands.

***Acacia melanoxyton* R. Br.**

THE BLACKWOOD.

The *Blackwood*, which has been in cultivation in our Territory, belongs more to the higher levels rather than to Honolulu, though a few trees can be found on residential grounds on Nuuanu Avenue; it is planted mainly on Tantalus and on other higher situated localities throughout the Territory and does not really come within the scope of this work. It resembles the Hawaiian *Koa* (*Acacia Koa*) greatly, though it does not reach such handsome proportions. The phyllods, or false leaves, which are really dilated leaf stalks, are not as graceful as those of the *Koa*; they are not curved but more or less straight and give the tree a rather stiff appearance. Mention may also be made here of the various wattles, as *Acacia decurrens*



Albizzia saponaria (Lour.) Bl.
Flowering and fruiting specimen.

and *A. dealbata* with which the *Blackwood* is usually planted on the drier slopes of our mountains. It is called the *Blackwood* on account of the dark color of the heartwood. The specific name *melanoxyton* is from the Greek and means Black-wood.

It is a native of Tasmania and Australia, and is considered one of the most valuable timber trees of that country.

***Prosopis juliflora* (Sw.) DC.**

KIAWE, ALGARROBA, ALGAROBA.

Plate XXXVI.

The *Algaroba* is by far the most common as well as the most valuable of all the introduced trees in the Hawaiian Islands. No tree so far introduced has proved of such enormous benefit to these Islands as the *Algaroba*. Nevertheless the exact identity of this valuable tree has as yet not been definitely determined. It seems to be a very variable species, not only in these Islands, where specimens occur bristling with spines and then again others without a thorn, but also in its native home, which by the way, seems to include the West Indies, the southern United States, Central America, and even portions of South America, as for example, Brazil and Peru. In the "Flora Brasiliensis" of Martius, a monumental work, *Prosopis dulcis* is looked upon as a synonym of *Prosopis juliflora*, and is recorded from Brazil as a large tree.

It has been stated to be also identical with a species occurring in Texas and New Mexico, which has, however, been recorded lately by E. O. Wootton and P. C. Stanley in their "Flora of New Mexico" (1915, Contrib. U. S. Nat. Herb. V. 19), as *Prosopis glandulosa* Torr. (the Mesquite). Its range is given as Arizona and New Mexico to Oklahoma and Texas. The legume is described as indehiscent, slightly compressed, straight or falcate. The height of the plant is given as 3 meters (about 12 feet).

In order to avoid confusion, the writer adheres to the name *Prosopis juliflora* for the tree found in Hawaii, which in all probability is identical with the plant known by that name elsewhere, as for example, in Brazil. All the waste lands in these Islands, which previous to the introduction of this valuable tree were absolutely barren, are now covered with green forests made up exclusively of this tree. It grows exceptionally well on the lee sides, and for miles there exist now almost impenetrable jungles, which not only supply excellent firewood, but furnish flowers with the best of nectar

Plate XXXVI.



Algaroba Trees, *Prosopis juliflora* (Sw.) D.C. on the Punahou Campus.

for honey-making. The pods, in addition, are eaten by all kinds of grazing animals, and so great has been the demand for pods as fodder that there was formed in Hawaii the Algaroba Feed Co., and machinery was invented to macerate the pod. It can safely be said that the Algaroba is now indispensable in Hawaii, and that it is one of the greatest blessings that were bestowed on this Territory. The history of the introduction of this valuable tree was published by Father Reginald Yzendoorn of the Catholic Mission, in 1911, and for a detailed account the writer wishes to refer anyone interested, to Father Reginald's paper in the Eighteenth Annual Report of the Hawaiian Historical Society. The progenitor of all the Hawaiian Algarobas is still alive and can be seen on the premises of the Catholic Mission on Fort Street. The inscription reads: "First Algaroba Tree of the Hawaiian Islands, imported and planted in 1837 by Father Bachelot, founder of the Catholic Mission. Later evidences unearthed by Father Reginald, however, seem to prove that the tree was not planted in 1837, but earlier. For the following quotations and remarks the writer is greatly indebted to Father Reginald, who, in a letter, says (he refers first to his article and then continues): "I may add to this article two quotations from the journal of Brother Melchior, who remained here during the exile of the priests in California. I had not seen that diary when I wrote the above-mentioned paper.

"January 12, 1832.—The old chiefess passed by our house to go and see the governess; she sent her husband to ask me for some branches of our tree at the end of the yard'.

"August 15, 1832.—The tree at the end of the yard bears fruit. Mr. Pablo (a Spaniard then living at the Mission) calls it in Spanish "Algarroba." He knows it; the fruit is principally eaten in times of famine. They grow in the provinces of Malaga and Valence, but this one is of a more delicate and less sweet species'."*

Father Reginald concludes: "These quotations show that the legend of the picture (an illustration published with Father Reginald's article.—The author.), saying that the tree was planted in 1828 is true, as four years later it bore pods, evidently for the first time. Notice also the interest the natives were taking in the tree, and how they tried to propagate it by planting cuttings, naturally, as they had no seeds as yet."

* The writer would say that Mr. Pablo evidently had the St. John's Bread, *Cerantonia siliqua*, in mind, and when he says "more delicate" he evidently referred to the less robust habit and much finer leaves. The pods of St. John's Bread are very sweet and quite palatable.



Saraca indica Linn.

Sorrowless Tree of India. Flowering branches.

In the illustration published and herein referred to by Father Reginald, it is stated that the tree was introduced by Father Bachelot in 1828, the seed having come from the Royal Gardens of Paris, France. *Ceratonia siliqua*, the St. John's Bread, is cultivated on Tantalus.

Adenanthera pavonina L.

RED WOOD, RED SANDALWOOD, FALSE WILIWILI.

This so-called *Wiliwili* is a small tree reaching a height of from fifteen to twenty-five feet and is bare for a short time during the year. Its leaves are bi-pinnate with six to ten pairs of leaflets to each pinna, the former are ovate or oblong-elliptical, and glabrous; the flowers are borne in short racemes and are yellowish in color. The legume or pod is from four to twelve inches long, brown outside, golden yellow inside, linear, compressed and incurved; the seeds are scarlet, round and compressed.

The leaves as well as the seeds are employed medicinally. Of the former a decoction is used as a remedy for chronic rheumatism and gout. The latter are more often used as an article of food and as weights, each seed weighing about four grains.

It is a very common tree in and about Honolulu but cannot be considered as ornamental save for the red seeds which are sold in Honolulu curio stores as *wiliwili* necklaces.

The wood is hard, close grained, the heartwood red, durable and strong. In India a dye is prepared from the wood of this tree but its chief use is as a substitute for the real red sandalwood. The timber is used for housebuilding and cabinet making in India where the tree grows to a considerable size.

It is often confounded with the true red Sandalwood (*Pterocarpus Santalinus*) which yields the red sandalwood of commerce. Both species, however, have really nothing in common with the fragrant Sandalwood.

It is a native of India and Burmah, but has been in cultivation in many tropical countries.

Saraca indica L.

ASOKA OR SORROW-LESS TREE OF INDIA.

Plate XXXVII.

This rather small tree is a native of Central and Eastern Himalaya, Bengal, South India and occurs in Kumaon in which latter place



Trachylobium verrucosum Lam.

Copal Tree. Fruiting specimen.

it grows to an elevation of two thousand feet. It is now distributed all over India and is cultivated in many tropical countries but is indigenous in Eastern Bengal. It is an exceedingly handsome object when in full blossom and reminds one somewhat of the *Ixora*. The flowers are of a coral-red and arranged in large globose heads in the axils as well as at the ends of the branches; the leaves have almost no leaf-stalk, are leathery, oblong in outline and entire.

The bark of this tree is much used by the natives of India for medicinal purposes, as it contains a large proportion of gallic acid. The *Asoka* is one of the most sacred trees of the Hindus, who are ordered to worship it on a certain day in the year. The flowers, which are quite aromatic, are much used in temple decoration. The tree stands for the symbol of love and is dedicated to the Indian God of Love. The *Asoka* is also held sacred by the Burmese, who believe that Buddha was born under its shade. The word *Asoka* signifies "that which is deprived of grief," hence the name *Sorrowless Tree*.

The wood of the *Asoka* is rather soft and of a light reddish brown color, the heartwood is, however, hard and dark colored.

There seem to be only two or three trees of this species growing in Honolulu; it is in flower nearly all the year round and can be seen in the grounds of the Government Nursery facing King Street, and in private grounds on Nuuanu Street.

Trachylobium verrucosum Lam.

COPAL TREE.

Plate XXXVIII.

The *Copal* is a small unarmed tree with terete branches. The leaves are short-petioled, consisting of a single pair of oblique, oblong, rigid-leathery leaves, two to three inches long. The flowers are borne in ample corymbose panicles, the lower branches of which spring often from the axils of the leaves. The calyx is short, the segments oblong and tomentose. The petals are white, the three upper often exserted from the calyx. The pod is oblong, thick, warty and two inches long. This species, which is represented in Honolulu by very few specimens, perhaps by a single one only, is a native of Madagascar, tropical Africa, Mauritius, and the Seychelle Islands.

It is often cultivated, but only for its gum-copal, a hard transparent substance resembling amber, a natural exudation of this tree. The gum is yielded by the living trees, but the commercial sub-



Tamarindus indica L.

Tamarind.
Flowering and fruiting specimen.

stance is derived mainly from fossil copal, which occurs in large quantities buried in the sand, chiefly near the coasts, away from any living trees.

A good specimen occurs in the grounds of the Board of Agriculture and Forestry on King Street.

Tamarindus indica L.

THE TAMARIND TREE.

Plate XXXIX.

The *Tamarind* is a large evergreen tree which often reaches a height of eighty feet and a circumference of twenty-five feet. No trees of such size occur in Honolulu. Its origin is somewhat doubtful, but it is probably a native of tropical Africa. It is a very common tree about Honolulu where it has been in cultivation for a long time. In India the tree is extremely common and is frequently planted in avenues. Its beautiful foliage makes it quite an attractive tree. Its pods contain seeds which are surrounded by an acid pulp of pleasant flavor, making a delicious cooling drink when mixed with water. The leaves have twenty to forty oblong leaflets. The flowers are borne in lax terminal racemes, the petals are five in number, only three of which are developed, and are yellow with red stripes, while the two lower ones are reduced to scales.

The leaves, flowers, and fruits contain a quantity of acid and are employed as a dye in conjunction with other dye-producing flowers. From the seed is expressed an oil of beautiful amber color which is odorless and sweet to taste, and has been advocated for culinary purposes as well as for the preparation of varnishes and paints.

Knowledge of the value of the *Tamarind* as a medicinal plant dates back into a remote period in Sanskrit medicine and has become known through the Hindus to the Arabians, who in turn through their writings made it known to the Europeans in the middle ages.

The name *Tamarind* is derived from the Arabian *Tamare-Hindi*, which means "Indian date," the Arabians thus adopting for it the name of their own finest fruit. In the early periods it was thought that the fruit was derived from a wild Indian palm. It was first accurately described in the sixteenth century.

The fruit is an excellent purgative and was known in Europe from the middle ages, enjoying a reputation for all the virtues which were ascribed to it by the Arabs and Persians, and to this day it is used India for all purposes for which it was employed in those ancient times.

Plate XL.



Bauhinia tomentosa L.
Flowering and fruiting branch.

The fruit is officially recognized in Europe and America as a valuable laxative and as a refrigerant in fever. As food it is used in curries and chutneys of which it is a pleasing ingredient. Still another use is made of the seeds, which after having been pulverized are boiled with thin glue into a paste, and form an exceedingly strong wood-cement, perhaps one of the strongest known.

The wood is yellowish white, hard and rather close-grained; the heartwood is comparatively small and dark purplish brown in color. It is highly prized but very difficult to work, and is employed in India for wheels, mallets, furniture, etc.

The *Tamarind* is easily propagated from seed and forms an excellent shade tree for roadsides, especially well adapted to dry localities.

Bauhinia tomentosa L.

Plate XL.

This species is an erect, branching shrub, ten to fifteen feet in height; the branchlets, lower surfaces of the leaves and the pods are somewhat velvety tomentose. The leaves are about as wide as they are long and are split one-third to the base into two ovate rounded lobes. The flowers are pale lemon yellow, usually in pairs or single on axillary pedicels. The pod is about four inches long, half an inch wide, flattened, pointed, and contains six to ten seeds.

This *Bauhinia* is a native of India, especially common in the northwest Provinces and extending throughout India to China, Ceylon and tropical Africa.

It is usually cultivated for ornamental purposes and flowers most of the year. In Honolulu it is occasionally met with, but has not been planted as commonly as *Bauhinia monandra*; plants may be found in Kapiolani Park and on the corner of Punahou Street and Wilder Avenue, opposite the Pleasanton Hotel.

The wood is tough and close-grained, but when full-grown it is very soft. As a medicine the plant is antidyenteric and useful in liver complaints. A decoction of the root-bark is useful in inflammation of the liver, while the dried buds and young flowers are prescribed in dysenteric affections. From the bark the natives of India prepare a durable fibre.



Bauhinia monandra Kurz.

St. Thomas Tree.
Flowering and fruiting specimen.

Bauhinia monandra Kurz.

ST. THOMAS TREE.

Plate XLI.

This *Bauhinia* is a small or medium-sized tree with long, spreading branches. The leaves are from four to five inches, both in length and width, and cleft about half way to the base, the lobes are rounded, the base is cordate. The racemes are few-flowered and axillary. The corolla is about four inches in diameter, the petals are spreading, narrowly obovate, long-clawed, pink-purple with numerous darker dots, the upper petal is much darker than the others. It has only one single stamen, hence the specific name. The pod is stout, thick, about eight inches long and one inch wide.

It is probably a native of tropical America, but is now cultivated for ornamental purposes in many tropical countries. In Honolulu it is commonly met with in parks and private grounds.

Cassia siamea Lamk.(Syn. *Cassia florida* Vahl.)

KASSOD TREE.

Plate XLII.

The *Kassod Tree* is of rather low stature with twiggy branchlets which are covered with a fine gray down. The leaves are one-half to one foot long, and the leaflets are oblong, of a bluish hue very strongly veined, distinctly stalked and two to three inches long. The bright yellow flowers, which are not veined, are borne on one-half to one foot-long panicles both axillary and terminal. The pod is almost straight, flat, distinctly stalked, six to nine inches long, and one-half inch wide, and of firm texture.

It is a native of South India, Burmah, Ceylon, and is also distributed over the Malayan Peninsula and Siam. As already stated, it is a moderate-sized tree, with smooth bark. The sapwood is whitish and rather large, the heartwood brown or almost black, rather hard and durable.

In Burmah the wood is employed for mallets and walking-sticks, while in India, especially South India, little is known of it, but is considered a fine fuel in Ceylon.

In Honolulu the tree has been more or less extensively planted in private grounds especially along King and Beretania streets, where it can be easily recognized by its long terminal as well as axillary



Cassia siamea Lam.

Flowering and fruiting specimen.

panicles of yellow flowers. The exact date of introduction into this Territory is not known to the writer, but dates back evidently to the time of Dr. W. Hillebrand in the early seventies. It flowers in late summer and the early part of autumn when all of our other showy leguminous trees have laid down their bright colored robes.

***Cassia alata* Linn.**

ACAPULCO OR APULCO.

Cassia alata is a small, short-lived shrub, with thick, downy branches, the equally pinnate leaves are from one and a half to two feet long; the leaflets, of which there are sixteen to twenty-eight per leaf, are oblong, have a broad apex and increase in size upward. The inflorescence is terminal, spike-like often a foot and a half long and bears large yellow flowers. The pods are straight, and have a papery wing running from end to end, hence the name *alata* (winged).

The bark is useful as tanning material in India. The leaves, which enjoy a medicinal reputation among the natives of India, who employ them as a local application in skin diseases, are said to cure all poisonous bites, as well as ringworm, when crushed and applied fresh.

It is a native of tropical America but is now widely distributed. In Honolulu it is not plentiful but can be met with in gardens where it is planted as an ornamental shrub.

Cassia glauca Lam. A native of South-eastern Asia, is a small tree very commonly planted and even naturalized in and about Honolulu and probably in other parts of the Territory. It has yellow flowers borne in corymbs and thin papery pods which open on one side. The bark is said to be of medicinal value in diabetes when given mixed with water and sugar.

Cassia laevigata Willd., also of early introduction, resembles *Cassia glauca* but is a shrub and differs from the latter in the pods which are round instead of flat, with the seeds arranged horizontally in septae or divisions. It is especially common in Nuuanu and Pauoa Valley, where it grows profusely over fences along water courses. The natives call it *Kalomona*.



Cassia fistula Linn.
Golden Shower.
Flowering branch.

Cassia fistula L.

GOLDEN SHOWER, THE INDIAN LABURNUM, PURGING CASSIA.

Plate XLIII.

The *Golden Shower* is a very handsome, moderate-sized tree which becomes bare during the winter months, and brings forth, during the early summer or late spring, long racemes of golden yellow flowers, which are followed in the fall by long, cylindrical, woody pods twenty to thirty inches in length.

The *Golden Shower* is a native of India and Ceylon, growing wild in the sub-Himalayan tracts, from the Kashia hills to Peshawar in the northwest frontier Province, and extends through Central India. It hardly grows taller than twenty feet and has rather drooping branches. It is suitable to rather dry regions, but thrives also in moist districts; in its native home it ascends to an elevation of three thousand feet.

The trunk of this tree exudes a reddish juice which solidifies and becomes gummy. The bark is used in tanning; a red dye is also extracted from it.

The root, bark, and the pulp of the fruit are employed medicinally, especially the latter, which is a simple purgative. It is quite safe and may be given to children. The bark and leaves are also valued, and are used externally in skin diseases, especially in ring-worm.

The flowers, which are exceedingly showy, are used in temple ceremonies in Ceylon.

The wood of the *Golden Shower* varies from a gray or yellowish red to brick red. The heartwood is quite hard, and of small diameter, and makes excellent posts, while the sapwood is very large. The wood is considered quite durable, but owing to the small size of the trees cannot be used for timber.

In Honolulu the *Golden Shower* is planted gregariously on account of its fine drooping racemes of yellow flowers. Certain streets have been planted with *Golden Shower* only, such as Pensacola Street, while others have been planted with its rivals, the *Pink Shower*, *Cassia nodosa*, and *Delonix regia*, the flame tree of Madagascar.

Cassia grandis Linn.

PINK SHOWER OR HORSE CASSIA.

The American *Pink Shower* grows to a height of fifty feet or more and is an elegant tree with more or less ascending branches.



Cassia nodosa Ham.

Pink and White Shower.
Flowering branch.

Its pinnate leaves are eight inches in length, alternate, and have from ten to fifteen pairs of oblong leaflets which are covered with fine soft hair of a copper color, similar to the young branchlets. The flowers are borne in abundant racemes which are shorter than the leaves. The flower, flowerstalk, and calyx are clothed with a grayish pubescence. The corolla is deep pink, about an inch in expansion. The pod is larger than that of any other cultivated *Cassia* in Honolulu, being a foot and a half in length and an inch or more thick. It is rough, woody and has two prominent ridges on one side. The pulp has an offensive odor.

Like *Cassia nodosa*, it is an exceedingly handsome species and flowers during the months of February and March and is practically out of flower in the early part of April; it is deciduous or partly so while in flower.

It is a native of South America but occurs also on the islands of the Carribean Sea. On account of its beautiful inflorescence it has been cultivated in many tropical countries and is well established in Honolulu.

***Cassia nodosa* Ham.**

PINK AND WHITE SHOWER.

Plate XLIV.

Cassia nodosa, formerly known as *Cathartocarpus*, is a tree of moderate size, with long drooping branches which are slightly downy; the leaves are a foot or more long and are composed of twelve to twenty-four moderately large, oblong, distinctly stalked leaflets two to four inches in length, and are oblique at the base, glossy and distinctly veined. The flowering racemes are short, corymbose and are produced from the old branches, are dense, and under half a foot long. The flowers are of a beautiful rose pink or whitish pink, with yellow stamens, the pedicels are twice as long as the flowers. The pod when mature is about a foot long and a half an inch thick.

This magnificent flowering tree is one of the most commonly cultivated ornamental plants in Honolulu, where it has been much used for street planting. During the months of May and June it bears a profusion of bright pink rose-scented flowers and is an object of great beauty. The flowers are followed by cylindrical pods and the tree finally becomes bare during the winter months.

It is a native of India and ranges from the Eastern Himalaya to the Malay Isles and the Philippines. In Hawaii the tree is never



Delonix regia (Boj.) Raf.

Poinciana regia, flowering specimen with pod.

very tall, but in Java the writer has seen specimens over fifty feet in height.

A closely allied species, if indeed at all distinct from the above, is *Cassia Javanica*, recorded by Hillebrand as cultivated in Honolulu. It is supposed to differ from the former by its smaller and more obtuse leaflets; the inflorescence is the same.

Haematoxylum campechianum Linn.

LOGWOOD OR BLOODWOOD TREE.

The *Bloodwood Tree* reaches a height of thirty to forty-five feet, but has a short trunk rarely attaining a height of six or nine feet, growing very irregular and continuing into large straight branches. The leaves are abruptly pinnate with three to four pairs of small obovate obtuse leaflets which are rigid-veined. The fragrant flowers are copious, in dense axillary racemes, petals bright yellow, with ten free stamens at the base. The pod is flat, membranous, and narrowed at both ends.

The tree is rather handsome when in flower. It is a native of Central America and the West Indies, but is cultivated in many tropical countries. In Honolulu only a few trees can be found, as on Wilder Avenue and in the Government Nursery grounds on King Street.

The wood is very hard and heavy, compact in texture, dark purple in color, with darker stripes, occasionally marked with orange, especially towards the sapwood. It is chiefly employed in the production of dye, but is also used by woodturners.

Delonix regia (Boj.) Raf.

POINCIANA REGIA, FLAME TREE, FLAMBOYANT.

Plate XLV.

The *Poinciana regia*, whose proper name is *Delonix regia*, is a deciduous, rapidly growing tree with a flat crown, though reaching a height of sixty feet or more; the leaves which are gracefully bipinnate have ten to twenty pairs of pinnae, each pinna with many small oval leaflets. The flowers are arranged in terminal racemes, and are extremely showy, being bright scarlet or red and yellow and quite large. The upper petal is usually striped with yellow, while the four lower are all red. The pod is flat, strap-shaped, somewhat curved, and about twenty-four inches long and two inches wide.

The *Poinciana* is a native of Madagascar and is one of the



Caesalpinia pulcherrima (L.) Sw.

Flowering and fruiting specimens of Pride of Barbados.

handsomest flowering trees. It has been introduced into many tropical countries, and has been in these islands since about 1855, when it was introduced probably by Dr. Hillebrand. It has been planted in avenues of late and will soon make a fine showing. Its spring and summer attire of beautiful green graceful foliage and large scarlet blossoms, makes up for its bareness during the winter, when the tree is really ungainly.

The wood of the *Poinciana regia* is white to light yellowish in color, loose-grained, and takes a fine polish.

The tree yields a yellowish or reddish brown gum containing oxalate of lime. When placed in water this gum does not dissolve but forms an opalescent mucilage.

Caesalpinia pulcherrima (L.) Lw.

PRIDE OF BARBADOS.

Plate XLVI.

The *Pride of Barbados* is a small, erect, somewhat spiny bush, or occasionally a small tree reaching a height of from four to twenty feet, but rarely more. Its flowers are borne in terminal racemes, and are either yellow or red and yellow. It is a native of tropical America, but has been in cultivation in nearly all tropical countries and has even become naturalized in these islands. It is usually planted as a hedge or scattered bushes. It can be seen nearly all over town in various gardens and especially at Kapiolani Park, Waikiki. It deserves to be cultivated, but has been rather neglected in Honolulu where it has sprung up of its own accord in waste places. Its showy flowers make it quite attractive, especially as it remains in flower all the year round.

The leaves as well as the flowers and seeds have been employed medicinally; the former are said to be purgative.

In India the shrub is sacred to the God Shiva. The natives of India make ink from the charred wood.

Caesalpinia coriaria Willd.

AMERICAN SUMACH OR DIVI-DIVI.

Plate XLVII.

The *Divi-divi* is a small tree with finely bi-pinnate foliage of a dark green color. The leaflets number sixteen to twenty-four pairs, are oblong linear and blunt. The flowers are white and arranged



Caesalpinia coriaria Willd.

Divi-divi, fruiting branch.

in contracted compound racemes. The legume or pod is one and a half to two inches long, laterally incurved, flatly compressed, somewhat convex on the outer, concave on the inner side and six to eight seeded.

The sinuous pods of the *Divi-divi* contain a large quantity of a very powerful and quickly acting tanning material which is very valuable. The tree is cultivated in India and other tropical countries mainly for its seeds, but in Honolulu only a few specimens are extant. Here it is mainly grown as a curiosity, rather than for either beauty or usefulness. One tree may be found in the Government Nursery grounds on King Street and another in the courtyard at Hilo, Hawaii. The pods have still another use; a powder is prepared which is of a light yellow color and astringent to taste; it is used as an antiperiodic in cases of intermittent fever, and as such it has been tried with excellent results in India.

The *Divi-divi* is a native of South America and the West Indies, found mainly in marshy situations in New Granada, Mexico, Northern Brazil and Jamaica.

Caesalpinia sappan Linn.

SAPPAN WOOD.

Caesalpinia sappan Linn. The *Sappan Wood* is a small thorny tree reaching a height of fifteen feet with leaves a foot and a half long composed of about twenty opposite pinnae with twenty to thirty leaflets, which are oblong-rhomboid, oblique, and are attached at the lower corner. The flowering panicles are often as long as the leaves and are terminal. The flowers are an inch in diameter and yellow; the pods oblong to oblong obovate, hard, shining, about three inches long and one and a half wide, with a hard recurved beak at the upper angle.

The *Sappan Wood* yields a valuable red dye which is, however, also prepared from the pods and bark, while the root is supposed to afford a yellow dye.

Sappan Wood is mostly used in calico-printing, it is steeped in water and yields a red dye. It is, however, not permanent. The wood, though chiefly used as a dye, is said to be a useful astringent, containing tannic and gallic acids; it is given internally in decoction and is useful in certain forms of skin diseases. The natives of India use it also as a blood purifier. It is a native of Malay and India but is not a common tree in Honolulu whither it was introduced in the early sixties.



Peltophorum inerme (Roxb.) Naves

Yellow Poinciana, flowering and fruiting branch.

Peltophorum inerme (Roxb.) Naves
(Syn. *Peltophorum ferrugineum* Benth.)

YELLOW POINCIANA.

Plate XLVIII.

The so-called *Yellow Poinciana* is usually a tree twenty-five to fifty feet or even more in height, possessing a dense crown of spreading branches with the younger parts and flowering panicles brown-tomentose. The leaves are eight to sixteen inches long with ten to fifteen pairs of opposite pinnae, these again with ten to fifteen pairs of oblong leaflets. The calyx is brown tomentose, the corolla yellow; the pods are oblong, two and a half to three and a half inches long, longitudinally veined and contain from one to four seeds.

This handsome shade tree which flowers during the summer months and the early fall is a native of Ceylon, Malaya and extends to Northern Australia. It is commonly cultivated in tropical countries on account of its symmetrical crown and handsome large yellow flowering panicles. When in fruit it is also conspicuous by its reddish pods, which become dark brown when mature. It is extensively cultivated in Honolulu, being planted in avenues, especially in Manoa Valley, while it can also be found in nearly every yard in Honolulu. It is particularly well suited to dry districts and often flowers twice a year at irregular seasons, but usually only in the late summer.

Castanospermum australe A. Cunn.

THE BLACK BEAN, MORETON BAY CHESTNUT.

The name *Castanospermum* is derived from the Latin *Castanea*=Chestnut, and *spermum*=seed. It is a tall glabrous tree with leaves one and a half feet long which are unequally pinnate, possessing eleven to fifteen ovate to broadly-oblong leaflets. The flowers, borne in racemes, are fleshy and resemble pea blossoms. They vary in color from yellow to orange and coral red, and are quite handsome. The pod is eight to nine inches long, about two broad, and almost round; the valves are thick and hard and contain three to five large chestnut-like seeds which are eaten by the natives of Australia to which country the tree is peculiar.

The native prepares the seeds for food by first steeping them in water for eight to ten days, after which the seeds are dried in the sun, roasted upon hot stones and pounded into a meal.

The seeds when eaten act as a strong laxative whether previously soaked or roasted. Owing to their highly indigestible character, the beans kill stock, the indigestible portion forming lumps in the stomach, on account of which the stock owners of Australia have waged war against this tree.

The wood of the *Black Bean* resembles walnut, to which it is scarcely inferior. It is often very beautiful in its markings and polishes readily, moreover, it is quite durable and will last any number of years underground.

In its native habitat the tree often reaches a height of sixty to seventy feet with a trunk of two to three feet in diameter. In Honolulu the writer knows of only one tree, planted by Dr. W. Hillebrand in his grounds on Nuuanu Avenue, where it flowers and fruits every year. The tree can be propagated from seed, and as it is an object of beauty should be freely planted.

***Sesbania grandiflora* (L.) Pers.**

SESBAN.

The *Sesban* is rather a small tree, rarely attaining a height of over twenty feet, and is not at all well established in Honolulu. It is a short-lived tree with very soft wood, bearing large, edible, white flowers and long sickle-shaped pods. The leaves are long and narrow, with twenty to forty pairs of oblong, pale green leaflets. It is now in cultivation in many tropical countries and is distributed from India to Mauritius, Malay and Australia. It yields a gum of a garnet red color which becomes nearly black when exposed to the air, and is very astringent. The bark, of which the inner portion yields a good fibre, is also astringent and has been employed in infusions in the first stages of small-pox and other eruptive fevers. In India the juice of the leaves and flowers forms a popular remedy for headache and nasal catarrh; it is blown into the nostrils and produces a copious discharge of fluid which relieves the painful pressure. The same juice is also squeezed into the eye to cure dimness of vision. The leaves and flowers as well as pods are eaten by the poorer natives of India in curries and as a vegetable. They are strongly laxative when taken too freely. A variety with red flowers is also under cultivation but less common. It is known botanically as var. *coccinea*.

Sesbania sesban (L.) Merrill, the Egyptian rattle pod, a cosmopolitan of the tropics, is also met with in Honolulu and vicinity. It has small yellowish purple flowers, and long, very thin, terete pods

which open and become spirally twisted when mature. It is a small ungainly tree of no ornamental value whatever.

Pterocarpus indicus Willd.

THE ANDAMAN REDWOOD.

NARRA (in the Philippines).

The *Narra*, or *Andaman Redwood*, is a large and lofty tree found in Burmah, the Andaman Islands, Philippines, China, Malay, and Polynesia. The leaves are three to six inches long, have seven to eleven ovate leaflets which are bluntly pointed, and are arranged alternately on the leaf rachis. The flowering panicles are in the axils of the leaves, are branching, and bear numerous yellow flowers. The seed pod is circular in outline, short-beaked, flat, and of a papery texture.

The sapwood of the *Narra* is small, while the heartwood is dark red, close-grained, moderately hard, quite durable and is not attacked by white ants. As it seasons well, takes a fine polish, and is easily worked, it is employed for furniture, carts, etc. In the Andaman Islands it reaches an enormous size and is said to be the most useful wood. In the Philippines it grows usually wild on the flat coastal plains behind mangrove swamps and scattered along streams in the low hills. It loves light and loses its leaves for a short time during the year. The tree exudes a gum which has been used commercially in India.

It was introduced into Honolulu and the Islands generally a few decades ago. Good-sized trees may be found but not very many; a good specimen may be seen on the grounds of the Board of Agriculture and Forestry. It reaches a height of seventy-five feet or more, with an average diameter of one and a half to two feet.

Pongamia mitis (L.) Merrill

The *Pongamia* is a rather tall erect tree or occasionally climber with glabrous branches and leaves. The leaflets are opposite, five to seven in number, oblong or ovate, pointed and stalked, and two to four inches long. The pale purplish flowers are half an inch long and are arranged in simple peduncled axillary racemes, nearly the length of the leaves. The pod is woody, glabrous, about a fourth of an inch thick, one and a half to two inches long, with a short recurved point.

It is a native of India, ranging from the Central and Eastern



Piscidia erythrina Linn

Fish Poison Tree.
Flowering and fruiting specimen.

Himalaya to Ceylon, Malacca, North Australia, Polynesia and the Seychelles.

It is not very common in Honolulu but deserves to be cultivated on account of its drooping branches and rather handsome flowers. So far only a few mature trees can be found, the best ones in the garden of Dr. Wm. Hillebrand, who introduced it into Hawaii about fifty years or more ago.

It yields a thick, black opaque gum, but hardly of sufficient quantity to be useful. From the seeds an oil is extracted in India which is used for illuminating and for medicinal purposes; it is of a light orange-brown color and bitter to the taste.

The bitter principle of the oil is not due to an alkaloid but is apparently contained in a resin. The oil, which is known as Kur-runje Oil, is described as a useful remedy in skin diseases and rheumatism, and is a remedial agent in cases of scabies and other cutaneous diseases. The wood is moderately hard and white, turning yellow on exposure. The leaves make a fine manure for wet cultivation and are effective in destroying blight.

***Piscidia erythrina* L.**

FISH POISON TREE.

Plate XLIX.

Piscidia erythrina is the only species in the genus and is a tree of medium size. The leaves are odd-pinnate and the oblong or elliptical leaflets are opposite. The whitish flowers which have a purplish tinge are small, six to eight lines long and arranged in short lateral racemes. The pod is two to four inches long, compressed, and bears along each margin two broad membraneous longitudinal wings. The pod contains six to eight seeds which are oblong, black and sub-compressed.

In Honolulu the writer knows of several trees which adorn Thomas Square Park, and are objects of beauty when in flower.

It is a native of the West Indies, Florida and Mexico.

The bark of *Piscidia* is used as a narcotic in stupefying fish.

***Inocarpus edulis* Forst.**

THE IVI OR TAHITIAN CHESTNUT.

The *Ivi* bears a thick crown of oblong leathery leaves, and small white flowers emitting a delicious perfume. The fruits are kidney-shaped and contain a kernel resembling chestnuts in taste.



Erythrina indica Lam.

Flowering specimen of the Coral Tree or Tiger's Claw.

The *Ivi* is a very peculiar tree and its position in the natural order of plants is doubtful and has puzzled the botanists considerably. The flowers are not papilionaceous and the fruit is not a genuine legume but a drupe. The coriaceous leaves are simple, another fact which estranges this plant from the family *Leguminosae*.

There are a few trees of this species cultivated in Mrs. Mary E. Foster's grounds.

It is a native of Fiji and other south Polynesian islands, ranging to New Guinea and the Indian Archipelago, where it reaches a height of sixty to eighty feet.

The seed is baked or boiled and eaten without further preparation, or grated is made into pudding or bread. The bark is astringent.

It is stated in the records of the Royal Hawaiian Agricultural Society that it was first planted by G. Wundenberg at Hanalei, Kauai, in 1849.

***Erythrina indica* Lam.**

FOREIGN OR INDIAN WILIWILI.

TIGER'S CLAW, INDIAN CORAL TREE.

Plate L.

The *Erythrina indica*, the generic name being derived from the Greek word red, alluding to the bright red flowers, is a deciduous tree reaching a height of forty-five feet; the branches and branchlets are stout, and armed with many sharp prickles; the leaflets, of which there are three in a leaf, have a broad base and are nearly triangular in outline; the racemes are terminal and bear numerous large red flowers before the appearance of any foliage. The pods are four to eight inches long and contain several dark carmine colored seeds the size of a bean. It is a moderate-sized, quickly growing tree, occurring throughout India from the foot of the Himalayas into Burmah, but now cultivated all over the tropics. In Honolulu numerous trees of this species are grown in various gardens and in private grounds.

In India the red flowers are dried and after having been boiled yield a red dye; the bark is also employed for dyeing and tanning purposes, as well as yielding an excellent fibre of a pale straw color. Medicinally the bark is used as a febrifuge and also as a collyrium in ophthalmia, while the juice of the leaves is considered a good cathartic and is employed similarly to the bark in conjunctivitis.

The wood of the *Indian Coral Tree*, though open-grained and very light, is durable and does not split or warp. It is used for boxes, toys, trays, etc., and is also good for firewood. Much of the

lacquered-ware of the different parts of India is made of the wood of this tree.

As it is bare for several months during the year and as the flowers and leaves are produced separately at different seasons, it is not a choice tree for ornamental purposes unless it is desired rather as an oddity.

A number of other species belonging to the genus *Erythrina* are in cultivation in Honolulu. Mention may be made of the shrubby species *E. crista galli* L.; *Erythrina subumbrans* (Hassk.) Merrill, formerly known as *E. lithosperma*, and *E. fusca* Lour. of which a single specimen occurs on Anapuni Street. There remain a few other species which the writer has not as yet been able to determine, owing to the large number of species in the genus, and the lack of a proper monograph on this difficult group of plants.

OXALIDACEAE

To this family belongs *Averrhoa carambola* L., a native of tropical America and now cultivated for its greenish-yellow, fleshy, angularly lobed fruit. Of the family *Geraniaceae*, the genus *Pelargonium* (the geraniums of the gardeners) is represented by a few species.

RUTACEAE

ORANGE FAMILY.

Of the many members of this family those of the genus *Citrus* are the most planted, but as they are not within the scope of this work the writer refers anyone interested in them to G. P. Wilder's book on the "Fruits of the Hawaiian Islands." Other genera worth mentioning are *Clausena* and *Aegle*. The former is represented by the *Wampi*, *Clausena Wampi* Oliv., a native of China, and the latter by the Bhel or Bael fruit *Aegle marmelos* Correa, a native of East-India. One of the ornamental species belonging to this family is the following:

Murraya exotica L.

MOCK ORANGE.

The *Mock Orange* is a shrub or small tree ten to twenty feet in height and glabrous throughout. The leaves are composed of usually three to seven glossy leaflets. The flowering cymes are short and few flowered. The flowers are white and very fragrant. The fruit

is ovoid, fleshy, of a red color and about half an inch long. It flowers from July to September. It is a native of India and China and extends southward to Australia and Polynesia. In India it grows in the outer Himalaya up to an elevation of 4500 feet, but is now cultivated nearly all over the tropics for ornamental reasons. It is also known as Satinwood. The wood is light yellow, close grained, and exceedingly hard. It resembles boxwood, and has been similarly employed. Quite a number of these shrubs may be seen scattered all over Honolulu in private premises as well as in parks.

BURSERACEAE

CANARIUM NUT FAMILY.

The only genus to be recorded as under cultivation in Hawaii is *Canarium* of which *Canarium commune* L., the *Canarium* or *Pili Nut Tree*, is the sole representative. It is a native of the Moluccas and Java. It is a slow grower but lends itself wonderfully for avenue or street planting, where durability and longevity rather than quick shade are required. The finest avenue in the world is the Canarium Avenue which leads into the famous botanic gardens at Buitenzorg in Java. An avenue of this wonderful tree would indeed be an asset to Honolulu.

MELIACEAE

SANTOL FAMILY.

The Santol Family is represented in Honolulu by several genera which will be treated below. Mention must be made of a species belonging to the genus *Toona* of which there is only a single tree in Honolulu. It is the *Toona febrifuga* (Forst.) M. Roem. a native of Java and India. The genus *Toona* and several of its species are not recognized in Index Kewensis, and *Toona febrifuga* is listed as a synonym of *Cedrela Toona* Roxb. which in fact is identical with *Toona ciliata* Roem. *Toona febrifuga* has entire pointed leaflets, large racemes and large capsules covered with lenticels, while *Toona ciliata*=(*Cedrela Toona*) has short racemes and small, smooth capsules.

It is a large tree fifty to sixty feet in height with long drooping branches. The bark yields a resinous gum, and the flowers a red and a yellow dye which is obtained by boiling the flowers. Medicinally the bark is used as a mild febrifuge. The tree was introduced by Dr. Hillebrand in whose residential grounds the original specimen

still flourishes, and bears fruits profusely. The fresh fruits have a strong odor reminiscent of garlic.

Swietenia Mahogani L.

THE TRUE MAHOGANY.

The *True Mahogany* is a large evergreen tree with abruptly pinnate, glabrous leaves consisting of six to ten leaflets, which are ovate-lanceolate and pointed; the woody capsule is dehiscent from the base, ovoid in outline and three to four inches long; the seeds have a terminal, oblong wing.

The Mahogany is a native of the West Indies extending to Mexico, Honduras and Peru.

This tree furnishes the very valuable red mahogany wood of commerce. The heartwood is reddish-brown, seasons well, and is easily worked. It is used mainly for furniture but occasionally also in ship-building. The tree yields a gum which is liquid at first but dries up readily into white brittle fragments. In the West Indies the bark is sometimes employed as a substitute for cinchona.

There are several mature trees in Honolulu, one which bears fruit profusely on upper King Street, others on the grounds of Luna-lilo Home. Lately Kalakaua Avenue has been planted with these trees. A great many woods resembling the *True Mahogany* in color have been termed Mahogany, as for example the wood of *Acacia Koa*, the native *koa* which has reached the market as Hawaiian Mahogany.

Melia Azedarach L.

PRIDE OF INDIA OR PERSIAN LILAC.

The *Pride of India* reaches a height of over forty feet but has a rather short trunk and broad crown. It is bare during a short period of the year. Its leaves have three to four pinnae with three to twelve ovate-lanceolate, deeply serrate or sometimes lobed leaflets. The flowers are lilac with a strong scent of honey. The fruit is a drupe, yellow when ripe and three-fourths of an inch long.

As the name implies it is a native of India, and also of Burmah. It is able to stand more cold than the Neem tree, growing at elevations of as much as 9,000 feet.

The leaves and flowers are used medicinally, a poultice prepared of them is employed to relieve nervous headaches. In America where the tree is considerably planted in the southern states a decoction

of the leaves has been used in hysteria, also externally against leprosy. The fruit is considered poisonous. The natives of India wear a necklace of them to avert contagion. The root bark of the tree is used as an anthelmintic in the United States. It is bitter and nauseous to the taste and gives up its properties to boiling water.

The sap wood is yellowish white, the heartwood red, and soft, it is handsomely marked and takes a fine polish.

The tree has been planted in the Hawaiian Islands to a great extent mainly in the uplands as on Maui, Hawaii and Kauai, on the latter Island the birds have spread the drupes and thus the tree has become naturalized and has spread considerably. In Honolulu the tree can occasionally be met with, having been planted for ornamental purposes. It is the China berry tree of the southern and western States of the Union.

***Azadirachta indica* A. JUSS.**

NEEM OR NIM TREE.

The *Neem Tree* is a large evergreen glabrous tree with hard red heartwood. The leaves are alternate and odd pinnate with seven to nine pairs of leaflets which are serrate, the odd leaflet often wanting. The flowers are white, strongly honey-scented, and arranged in axillary panicles which are shorter than the leaf. The drupe is the size of an olive, first yellow but afterwards becoming purple, it is one-celled and one-seeded.

The Neem is a native of Burmah growing wild in dry regions of the Irrawady Valley but is cultivated throughout India and elsewhere in the tropics. It is one of the commonest trees planted in India especially the northern and northwestern provinces where the writer saw it extensively used along the Grand Trunk Road which leads from Bengal to Peshawar. It is planted by the natives near dwellings with the belief that its presence improves materially the health of a community.

A gum which the tree exudes is esteemed as a stimulant. The seeds, by boiling or pressure, yield a fixed acrid bitter oil of a deep yellow color, which is employed medicinally as an anthelmintic and antiseptic, and by the poorer classes of India for burning in lamps.

The natives of India cook the leaves with other vegetables in the form of curry or eat them parched. They are also used to protect cloth, paper and books from the ravages of insects. The tree is held sacred by the Hindus who believe that by eating the leaves they acquire freedom from disease.



Amora grandifolia Walp.

Fruiting specimen.

In Honolulu the writer knows of only one large tree, with a trunk of over two feet in diameter and large surface roots. It was introduced and planted by Dr. W. Hillebrand on his premises. Another specimen is in the grounds of Dr. R. W. Anderson on the corner of Beretania and Keeaumoku Streets.

***Amoora grandifolia* Walp.**

Plate LI.

Amoora grandifolia Walp., a tall or medium sized tree with large unequally pinnate leaves, is one of about twenty species belonging to the genus *Amoora*, the name *Amoora* having been derived from the Bengali vernacular name *Amur*, applied to *Amoora cucullata* Roxb., the type of the genus.

The species here discussed is little known. It is a native of Malacca and supposed to be identical with *Amoora Aphanamixis* Schultes.

When in fruit the tree makes a fine showing, as the long drooping racemes are usually loaded with the pink to rose-red, globose fruits, which when open expose the brownish black, shining seeds, which are partly enclosed by a bright red to orange colored arillus.

There are very few trees of this species in Honolulu. One can be found in the Government Nursery grounds, others on Young Street and in Mrs. Jaeger's premises respectively. It was probably introduced by Mr. Jaeger, who was the first commissioner of agriculture in these Islands.

MALPIGHIACEAE

Several species of trees belonging to various genera are sparingly cultivated in Honolulu. Two of them, *Malpighia glabra* L. and a species of *Bunchosia* bear edible fruits.

Of ornamental value and also sparingly cultivated is a small shrub with terminal panicles of bright yellow flowers and small, glaucous leaves; it is the *Galphimia glauca* Cav. of the botanists and is a native of tropical America. Specimens may be seen in the late Gov. Cleghorn's residential grounds and at Mrs. M. E. Foster's premises.



Acalypha Wilkesiana Muell.-Arg.

Red Acalypha.

The pendulous spikes bear the staminate, the shorter terminal
the pistillate flowers.

EUPHORBIACEAE

EUPHORBIA FAMILY.

The *Euphorbiaceae* have quite a number of representatives both among the native and introduced species. Of the latter the ornamental species only concern us. There are about Honolulu a great many weeds which belongs to this family. Several genera are represented by only a single species which in turn is represented only by a single specimen as for example *Bridelia glauca* Blume a native of Java, cultivated in the grounds of the Government Nursery on King Street. Of the genus *Phyllanthus* about three or four species are under cultivation as *Phyllanthus emblica* L. with edible fruits a native of the Mascarene Islands, East India, the Sunda Islands, China and Japan.

There are about two specimens in Honolulu, one in the Mausoleum grounds, the other on Mr. Jordan's premises on Wyllie Street. *Phyllanthus distichus* (L.) Muell.-Arg. a native of India and Madagascar, with edible fruits is also present. The ornamental hedge plant *Phyllanthus nivosus* Bull, the so called *Snow Bush*, a native of the Pacific Islands is the most extensively planted species; it can be met with almost in every yard. It is exceedingly conspicuous even from afar off on account of the whitish-pink leaves, which gave it the horticultural variety name *roscopictus*. *Jatropha multifida* L. an ornamental shrub with umbel-like clusters of scarlet flowers and palmately divided leaves is sparingly cultivated. The writer knows of two specimens, one at the Seaside Hotel the other in the Royal Hawaiian Hotel grounds in Richards Street. *Jatropha curcas* L. is of early introduction and is met with in the valleys escaped from cultivation but not at all commonly. *Sapium sebiferum* (L.) Roxb. the Chinese tallow tree occurs at Lihue, Kauai.

Of interest, though not belonging to the introduced flora is the *Kukui*, *Aleurites moluccana* (L.) Willd. extensively planted in private grounds, especially in Manoa Valley, and easily recognized by its light yellowish green angularly lobed leaves which are covered with a whitish pubescence underneath. *Hevea brasiliensis* (H. B. K.) Muell.-Arg. the well known Para rubber tree may also be found occasionally, but was formerly planted for commercial purposes.

Acalypha Wilkesiana Muell.-Arg.

ACALYPHA OR RED KALABUCI.

Plate LII.

This species of *Acalypha*, a native of Fiji, is easily recognized by its large copper-colored leaves, which assume quite often a great variety of tints—pink, yellow, and brown, and then the plant is highly ornamental. The male and female flowers are borne separately, each sex on a slender spike, those with staminate flowers drooping and those with pistillate flowers upright. It is extensively cultivated in the tropics as a hedge plant, the vari-colored foliage making a pleasing contrast against the usual sombre green of other tropical plants. It is easily grown from cuttings. The Fijians know the plant under the name *Kalabuci damu* or *Red Kalabuci*.

Other species in cultivation are *Acalypha hispida* Bl. usually planted only as an ornamental bush and not in hedges. It is conspicuous on account of the floral spikes which are purple and quite showy. *Acalypha marginata* Sprengl has smaller leaves, edged with carmine and a reddish brown center.

A more commonly planted species is *Acalypha cuneata* Poep. et Endl. better known as *A. obovata*; it is a handsome species with green leaves and creamy white margins which turn to a crimson hue as the plant matures. Like *A. Wilkesiana* it is usually planted as a hedge, and grows freely from cuttings.

Codiaeum variegatum (L.) Blume

CROTON. *

The so-called *Croton* is an erect glabrous shrub or occasionally small tree reaching a height of often fifteen feet or more in Honolulu. The leaves are exceedingly variable in shape and color ranging from linear to oblong, and entire to sparingly lobed, they are undulate or even spirally twisted and sometimes interrupted. The color ranges from pale green to purple, red and yellow, some forms are spotted or mottled.

The racemes are axillary, solitary, and about ten inches long. The male flowers are white. The so-called croton is a native of the Moluccas but is now extensively cultivated in nearly all tropical countries. The leaves vary tremendously in shape and color and the

* The name True Croton is applied to the numerous species belonging to the genus *Croton* of which *C. Tiglium* L. is often cultivated.

Croton is by far the most variable plant in the Hawaiian Islands. It is planted in hedges or in scattered clumps and is quite ornamental. Scale insects attack it very badly and if not washed carefully the plant has a dilapidated appearance.

Hura crepitans L.

SANDBOX TREE.

Plate LIII.

The *Sandbox Tree* is of medium height, thirty to forty feet, with a rather spreading crown and therefore often planted as a shade tree. The leaves are simple, broad and long stalked, heart-shaped, and have numerous white veins. The flowers of this tree are rather peculiar, the male or staminate flowers are arranged on a spike, while the pistillate flower is naked, with a large trumpet-shaped divided stigma. The fruit differs from that of other euphorbiaceous genera in having a capsule of numerous divisions, reminding one of the fruits of *Malva*.

When the fruits ripen they split open with a loud report, which has suggested the name "Monkeys' dinner bell."

The tree is milky throughout and decidedly poisonous, it is acrid and irritant. The *Sandbox Tree* is a native of tropical America but has been introduced into many tropical countries to be planted as a shade tree. The wood is rather soft, and fibrous in texture. The seeds are employed as a purgative as is also an oil expressed from them which is said to be less nauseous than Castor oil. In working this wood in the West Indies care is taken that the dust does not enter the eyes or nose as it is very irritant, produces inflammation, and may even lead to blindness. The milky juice when applied to the eyes causes almost immediate blindness according to reports from India.

In Honolulu there are only a very few trees or perhaps only two, one in the Government Nursery grounds, the other on the corner of Punahou Street and Wilder Avenue, on the vacant park-like lot, opposite the Pleasanton Hotel. Owing to its poisonous character it is not a desirable tree.

Euphorbia pulcherrima Willd.

POINSETTIA.

The *Poinsettia* is a milky shrub reaching a height of twelve feet. The leaves are elliptical, the upper ones lanceolate and pointed, the

Plate LIII.



Hura crepitans Linn.

Sand-box Tree, specimen with male (below) and female (extreme left above) flowers.

lower ones uniformly green and only the upper ones at the time of flowering, uniformly bright red. The inflorescence is terminal, the flowers are crowded and red; one or two large yellow glands are present on each of the involucre.

The *Poinsettia* is only ornamental during the winter months about Christmas time when it comes into flower, the conspicuous part is not only the flowers but the upper leaves, which turn bright red. It is a native of tropical America and Mexico, in which latter country it was discovered in 1828 by Graham. It is now cultivated in many tropical countries and is quite common in Honolulu. The milky juice is poisonous. After flowering the plant should be cut back.

Euphorbia heterophylla L., known as *Painted Leaf*, is also frequently cultivated but much less so than the *Poinsettia*. It differs from the latter in the very variable leaves of which the lower are entire, and the upper sinuately lobed and blotched with red at the base. It is also a native of tropical and temperate America.

Euphorbia splendens Boj., *Crown of Thorns*, an erect branched shrub three feet in height with grayish cylindrical or angled branches, which are armed with slender, sharp, long spines, can be found planted on rockeries and also as a hedge. It is in flower practically all the year round, the red flowers being not unattractive. It is a native of Madagascar but is now widely cultivated. Plants may be seen at the College of Hawaii grounds and on the Punahou Campus, near the caretaker's house.

Euphorbia tirucalli L. is an erect, glabrous ornamental shrub with green, fleshy, cylindrical branches, without leaves, and has been planted at Waikiki opposite the Moana Hotel. It is a native of Africa but has become naturalized in India.

Euphorbia antiquorum L. is a small cactus-like milky tree with three or five angled fleshy branches with spines and very few leaves, which are deciduous. It is cultivated in parks and private premises. It is a native of the dry and hot regions of India and Ceylon, where it is commonly planted as a hedge. Specimens may be seen in Kapiolani Park, on King Street, and elsewhere.

Euphorbia trigona Haw., a similar species with three to five angled, fleshy, cactus-like branches, occurs here also; it differs from the foregoing in having petioled, obovate-spatulate, fleshy leaves, each between a pair of thorns. It is closely related to *E. cattimandoo*. It is a native of the Deccan, where it occurs in dry, rocky situations. Specimens may be seen in Mr. G. P. Wilder's premises.

ANACARDIACEAE

MANGO FAMILY.

The most noteworthy members of the *Mango Family* cultivated in this Territory are *Mangifera indica* L., the *Mango*, a native of India and is here represented by many horticultural varieties. *Spondias dulcis* Willd. and *Spondias lutea* L., the *Wi Apple* and *Hog-plum* or *Otaheite Apple*, respectively, also *Spondias mangifera* Willd. occur. The first is a native of the South Sea Islands; the second of the West Indies, and the third, of which there is only one tree in Honolulu, in the premises of Mrs. M. E. Foster on Nuuanu Street, is a native of India, where it ascends to 5000 feet elevation in the Himalayas.

Anacardium occidentale L., the *Cashew Nut*, a native of America, is rarely met with; two trees occur on Dominis Street, near Punahou.

Of *Semecarpus Anacardium* L. there is only one tree to be found as far as the writer is aware, it grows in the grounds of Mrs. M. E. Foster on Nuuanu Avenue. It is a small tree and a native of the tropical outer Himalayas, ascending to 3500 feet elevation. It was introduced by Dr. Wm. Hillebrand.

Schinus molle L.

PEPPER TREE.

The *Pepper Tree* is too well known to be described. Suffice it to say that it is extensively cultivated in Honolulu for street planting as well as on lawns in private grounds. It does not stand the wind well and is easily uprooted, it is also subject to a fungus and when it shows signs of disease should be severely cut back.

It is a native of tropical America, especially Brazil, but is now cultivated both in semi-tropical as well as tropical countries, principally in the Americas. In Honolulu it is of comparatively recent introduction.

A tree that has of late come into favor a great deal in Honolulu is the so-called Christmas-berry Tree, *Schinus terebinthifolius* Raddi., a much more robust species with axillary and terminal panicles of white flowers and globose, bright red, shining berries.

It is a native of South America, especially of Brazil, where a number of varieties occur, and from where it was probably introduced. It fruits during the winter months.

Closely allied to this family is the *Corynocarpaceae*, of which the *Karaka Tree* of New Zealand has been planted, especially on

Kauai in the mountains of Halemanu, where it is well established and already naturalized. It is known botanically as *Corynocarpus leavigata* Forster. It grows at sea-level in its native home and ascends to an elevation of 1200 feet.

SAPINDACEAE

SOAP-BERRY FAMILY.

The *Soap-berry* family is represented by several introduced species and mention must be made of *Sapindus saponaria* L., the *Soap-berry Tree*, which is also a native of Hawaii. Only a few trees are cultivated in Honolulu, one at the Government Nursery and another on the Beretania Street side of Mrs. Jaeger's grounds. A few trees of the *Longan*, *Euphoria longana* Lam. and one or two mature ones of the *Chinese Litchi*, *Litchi chinensis* Sonn., are also in cultivation.

The only species planted for ornamental purposes is *Harpullia pendula* Planch. of which a specimen may be seen in the Queen's Hospital grounds. It is a native of Australia, and when in fruit is quite attractive, the black seeds being handsomely contrasted against the orange-yellow capsule. It is erroneously known as *H. Hillii* in Honolulu.

The family *Rhamnaceae*, or Buckthorn family, is represented by *Zizyphus jujuba* Mill., the Jujube, a native of tropical Asia but now widely distributed. Several trees occur in Honolulu, as in the Queen's Hospital grounds and in the premises of Mrs. M. E. Foster, Nuuanu Avenue.

Of the *Vitaceae*, or Grape family, the genus *Leea* is now under cultivation. The writer is responsible for the introduction of three species: *Leea manillensis* Walp., from the Philippines; *Leea sambucina* Willd., and *L. aculeata* Blume from Java. They are quick-growing, small trees, with handsome inflorescences, the first species being very attractive on account of the large red inflorescence.

The family *Elaeocarpaceae* is represented by a single tree, *Elaeocarpus grandis* F. v. M. a native of Australia. A single tree of *E. grandis* occurs in the Government Nursery grounds on King Street.



Berrya Amonilla Roxb.
Trincomali Wood.
Fruiting specimen.

TILIACEAE

LINDEN FAMILY.

Represented by the following species only:

Berrya Amonilla Roxb.

TRINCOMALI WOOD.

Plate LIV.

The genus *Berrya*, named after the late Dr. Andrew Berry, a Madras botanist, consists only of a single species, here described and figured.

It is a large tree with ovate pointed alternate leaves which are heart-shaped at the base and five to seven nerved. The large flowering panicles are terminal as well as axillary. The calyx is bell-shaped and irregularly three to five lobed, while the corolla consists of five spatulate petals; stamens are many and are inserted on a short torus. The fruit is a papery capsule which opens into three to four valves; each valve is two-winged. The seeds are hairy and when touched sting like the minute hair of the prickly pear.

The *Trincomali Wood* is a native of South India, Burmah and Ceylon, but is cultivated in many tropical countries.

In Honolulu the writer knows of two trees; one is in the Government Nursery grounds on King Street, where it was evidently planted by the first Commissioner of Agriculture, Mr. Jaeger. The uses of the wood are manifold. The heartwood is dark red, close grained, is apt to check, but otherwise quite durable. Its weight is forty-eight to sixty-five pounds per cubic foot. In India the wood is employed for carts, agricultural implements, and even for small boats, while in Ceylon it is employed for building and other technical purposes on account of its toughness and flexibility. In Burmah a fibre is made from the bark.

MALVACEAE

HIBISCUS FAMILY.

Some of the most ornamental plants found in Honolulu belong to this family. Most of the many-colored species of *Hibiscus* which are employed as hedge plants are the result of patient labor on the part of many Honoluluans, as for example, W. M. Giffard, G. P. Wilder, A. Gartley, J. Cummins and others, while Mr. V. Holt of the United States Experiment Station has devoted a great deal of his

time to the hybridization of *Hibiscus*, with wonderful results. The first successful attempts in cross-fertilization were undertaken by Mr. W. M. Giffard in 1902, he having produced a large number of many-colored hybrids. Others then took up the work and perfected many exquisite creations. The native white and red species were mostly used in crossing with *H. Rosa sinensis* and its hybrids.

Other species of *Hibiscus* occurring in the Territory are *Hibiscus sabdariffa*, cultivated not for ornamental purposes but on account of the fleshy calyx, which is made into preserves; it is known as *Rozelle* on the market. *Hibiscus tiliaceus* is indigenous in the Islands. It is the *Hau* of the natives, and is trained into arbors, for which it is especially adapted. *Thespesia populnea*, another malvaceous species, known locally as *Milo*, is also indigenous. It resembles slightly the *Hau*, but is an erect tree with straight trunk, and its rather hard wood takes a fine polish. *Malva viscus arboreus* Cav. is a climber with red Hibiscus-like flowers. It is a native of tropical America and is sparingly cultivated in Honolulu.

***Hibiscus macrophyllus* Roxb.**

Hibiscus macrophyllus is a medium-sized tree with the branchlets, petioles and inflorescence densely clothed with a soft tomentum mixed with long tawny fasciculate hairs a third of an inch long or even longer. The leaves are entire, heart-shaped, and softly tomentose on both sides; the blade is from six to twelve inches in diameter, with a petiole of six to ten inches. The stipules are oblong, convolute, hispid tomentose and deciduous. The flowers are borne in axillary pedunculate cymes, each flower being enclosed in bud by two large ovate deciduous bracts. The corolla is two to three inches in diameter, yellow, and has a dark purple center. The capsule is pointed and hispid. The seeds are reniform and have long tawny hair on the edge.

This rather striking and well-named *Hibiscus* (*macrophyllus* = large leaved) is a native of India, where it occurs in Assam and Burmah, also in the Malay Peninsula and Java. In Honolulu a number of trees of this species are in cultivation, as in Thomas Square, in Mrs. Foster's premises, and on the other side of Oahu, where it has been found wild or rather as an escape from cultivation, in the valleys as in Kaipapau and other smaller valleys. On Hawaii several trees grow on the premises of Dr. B. D. Bond of Kohala.

Hibiscus rosa-sinensis L.

THE COMMON RED HIBISCUS.

The *Red Hibiscus*, commonly cultivated as a hedge plant in Honolulu, is too well-known to need description; it is present in every yard in Honolulu, being usually planted in hedges. It is probably a native of southeastern Asia, but is now in cultivation in all tropical and subtropical countries.

There are now numerous varieties of *Hibiscus* of all colors, single as well as double ones. A number of Honolulu people have made a hobby of cross-fertilizing the red *Chinese Hibiscus* with some of the native *Hibiscus*, of which there are two or three white flowering species, all trees, besides two red ones and a yellow one.

The writer would refer anyone especially interested in *Hibiscus* and their hybrids here in Honolulu to a bulletin published by the Hawaii Agricultural Experiment Station, under the title: "Ornamental Hibiscus in Hawaii," by E. V. Wilcox and V. P. Holt. Bull. No. 29 (1913).

It may be remarked that an infusion of the flowers produces a dye of a purplish hue. It is said that a red dye obtained from the flowers is used in coloring paper. The Chinese are said to utilize the flowers in a similar way and also to make a black dye from the petals for their hair and eyebrows.

The flowers are considered of medicinal value, and an infusion of the petals is given as a demulcent. The leaves are said to be emollient and laxative.

The bark, like that of *H. mutabilis*, yields a good fibre.

Hibiscus schizopetalus Hook. f.

CORAL HIBISCUS.

The so-called *Coral Hibiscus* is an erect, glabrous shrub, four to twelve feet high, with the branches often elongated and drooping; the leaves are oblong to egg-shaped, pointed, and have toothed margins. The flowers are borne singly in the axils of the leaves on long pendulous flower-stalks. The corolla is red, recurved and finely split into numerous slender laciniate lobes. The staminal tube is long-exserted and pendulous. This rather handsome species is common in cultivation and flowers all the year. It is in all probability a native of Africa, but is now cultivated in many tropical countries and can be found in nearly every garden of Honolulu, either as individual shrubs or planted as a tree hedge, as for example, on Young Street,



Hibiscus mutabilis L.

Changeable Rose-Mallow. The double variety.

near the High School. The *Coral Hibiscus* has been used in Honolulu to a great extent as a male plant in crosses with other *Hibiscus*.

***Hibiscus mutabilis* L.**

CHANGEABLE ROSE-MALLOW.

Plate LV.

The *Rose-Mallow* is an erect branched shrub, six to fifteen feet high, and more or less covered with short grayish stellate hairs; the leaves are five-lobed or five-angled, crenate, about eight inches long, pointed, and heart-shaped at the base. The pedicels are axillary, single, and three and one-half to five and one-half inches long. The flowers, which open white and turn pink to red as the day advances, are four and one-half inches in diameter, usually double, as in the case of the plant here figured, but sometimes single.

This true *Hibiscus* resembles a Mallow, whence the name *Rose-Mallow*. It is a native of China, but is now cultivated in most tropical countries. In Honolulu it is usually found on residential premises as an ornamental bush, but has not been used successfully in crossing with other varieties or forms of *Hibiscus*.

The bark of this species, like that of most of the other members of the genus, yields a strong fibre. The inner layer of the bark is soft and silky, while that of the outer layer is hard and lead-colored.

***Lagunaria patersonii* D. Don.**

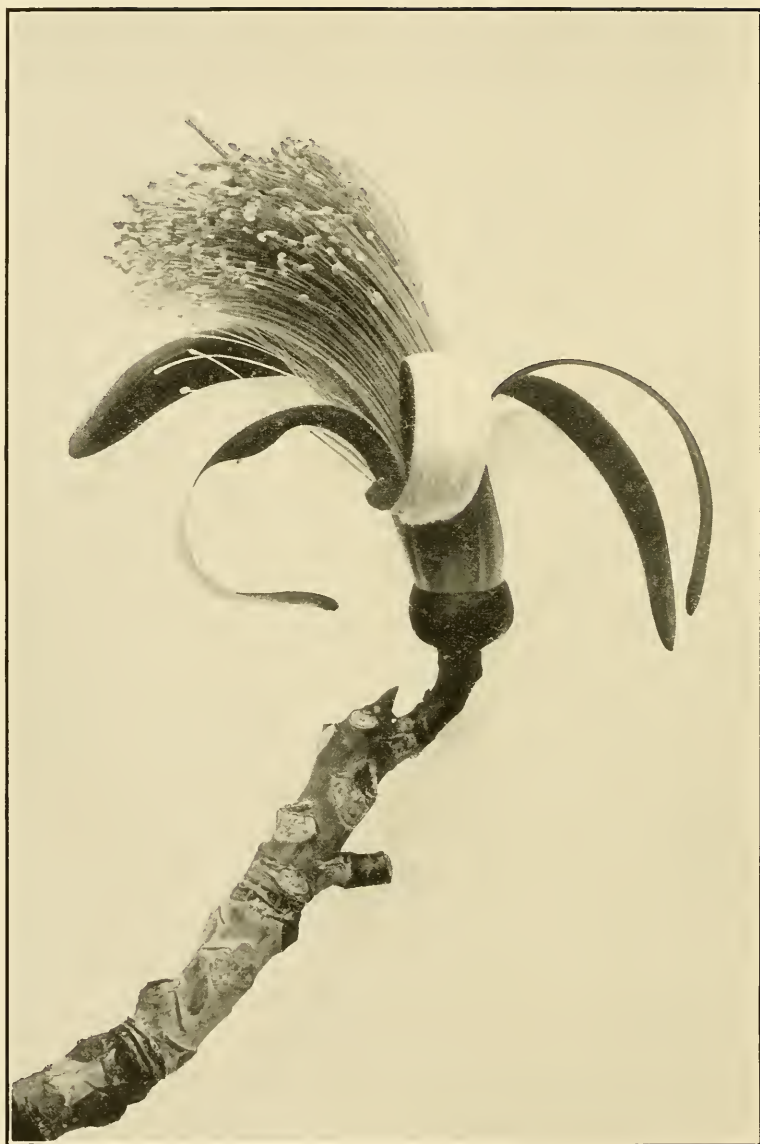
WHITE OAK, TULIP TREE.

The *White Oak* is a medium-sized tree, the young parts and inflorescence of which are more or less covered with minute scales, but otherwise smooth. The leaves are oblong, three to four inches long and somewhat leathery, they are white underneath when young, glabrous and pale green on both sides when full-grown.

The flowers are quite large and handsome, and are of a deep pink to purple, resembling the *Hibiscus* of the same family. The capsule is lined inside with short barbed hairs, which adhere to the skin, producing an irritation similar to that produced by the hair of the prickly pear.

The wood is quite soft and of no commercial value, not even suitable for firewood. From the bark, however, is prepared a beautiful fibre.

The *White Oak* is a native of Norfolk Island, where it grows



Bombax ellipticum H. B. K.

Flowering branch; one-half natural size.

scattered on the grassy hills, and is, perhaps, the largest known plant belonging to the Mallow tribe, reaching a height of eighty feet and a trunk of sixteen feet in circumference.

In Honolulu the writer knows of only two specimens, one of which can be found in the grounds of the Board of Agriculture and Forestry, where it flowers and fruits profusely, and the other on Mrs. Jaeger's premises on King Street.

It was evidently introduced and planted by Mr. Jaeger, the first commissioner of the above-mentioned board. In Honolulu the tree does not produce such large flowers as it is said to produce in its native home.

As the tree is shapely in appearance, it is worthy of cultivation and should be planted in avenues. It is well suited for planting along roadsides, especially near the sea, where it could well replace the somber-looking Ironwood, as for example, in Kapiolani Park at Waikiki. It likes a humid climate and a saline atmosphere. It is easily propagated from seed and probably also from cuttings.

BOMBACEAE

BOMBAX FAMILY.

Of the *Bombax Family*, which contains about 100 species, widely distributed in the tropics, three genera and four species are cultivated in the Islands. They are all treated separately in the following chapters.

Bombax Ceiba L.

COTTON TREE.

Bombax Ceiba is also a Cotton Tree, but usually of larger dimensions than *Ceiba pentandra*. Its trunk is very tall, often slender, and develops huge buttresses. Both trunk and branches are covered with stout, hard, conical spines. The branches are in whorls, the leaflets are digitate and deciduous.

The very numerous flowers are fasciated at the end of the branches when the tree is bare of foliage. The capsule is ovoid, six to seven inches long, five-valved, and filled with a silky floss in which the smooth seeds are embedded. This deciduous tree occurs throughout the hotter forests of India and Burmah, and is widely distributed over Java and Sumatra. In India it ascends to an elevation of four thousand feet. The inner bark of *Bombax Ceiba* yields a good fibre, which is suitable for cordage, while the floss surround-



Trunk of *Ceiba pentandra* (L.) Jaertn.

To left and right stems of *Areca catechu* L., the Betel-nut Palm, in
Mrs. M. E. Foster's grounds, Nuuanu Avenue.

ing the seeds yields the so-called "Silk Cotton," a fibre which is, however, too short and soft to be spun and is therefore used like that of its congener, *Ceiba pentandra*, for stuffing pillows, mattresses, etc. this fibre is known as *Simal*, while that of *Ceiba* is known as *Kapok*, the latter fetches a much better price owing to its better quality and white color; it also does not become matted as is the case with *Simal* fibre.

The trunk yields a gum known in India as *Mócha-ras*, containing a large proportion of tannic and gallic acids, both useful in medicine, as astringents. The wood of *Bombax Ceiba* is white, very soft and perishable, except under water, where it lasts rather well. In India the wood is used for planking, tea boxes, coffins, floats, and the lining of wells.

In Honolulu there are very few trees of *Bombax* to be found; one very tall specimen occurring on the Board of Agriculture grounds on King Street. For some reason *Bombax Ceiba* does not fruit in Honolulu and rarely even flowers. The identification is therefore doubtful.

***Bombax ellipticum* H.B.K.**

In the Queen's Hospital grounds there is a species of *Bombax*, with large handsome flowers which appear before the foliage. The flower buds are long and cigar-shaped and open with a quite audible noise, after the opening of the flowers the petals curl backward and expose a mass of pink stamens, which make the flowers exceedingly showy. It is a native of South America and is known botanically as *Bombax ellipticum* H. B. K. See Plate LVI.

The leaves of this species have five distinctly petioled leaflets which are prominently nerved underneath. The main petiole is about ten inches or more long. The tree itself is not ornamental, as it is bare of foliage for a period and is only about fifteen feet in height with very few branches.

***Ceiba pentandra* (L.) Gaertn.**

SILK COTTON TREE, KAPOK.

Plate LVII.

Ceiba pentandra differs from its relative *Bombax Ceiba* L. in its variable columnar trunk with large or often weakly defined buttresses which are sometimes entirely wanting. It is a tall tree with a straight trunk and is prickly only when young, and branches horizontally at right angles to the trunk. The flowers are of a dirty white, and much smaller than those of *Bombax Ceiba*. The flowers



Adansonia digitata Linn
Baobab, Bottle Tree, Monkey-bread.
Flowering and fruiting specimen.

of *Ceiba pentandra* have only five staminal bundles with two anthers each, while those of *Bombax Ceiba* divide into numerous filaments each with one anther. *Ceiba pentandra* is distributed from Mexico to the West Indies and Guiana, all over tropical Africa, East India, and the Malayan Archipelago. In India the tree is usually planted by the Tamils on the Coromandel coast about their temples. The flowers appear while the tree is destitute of foliage and are quickly followed by the leaves, while the fruits ripen in May.

The *Kapok Tree* has a white, soft wood, which is very brittle and of no use, except in the manufacture of toys. From the bark of the *Kapok Tree* an inferior fibre, reddish in color, is sometimes prepared and used in India locally for ropes and paper. The floss from the seed is, however, of great merit, and most important commercially. The capsules are densely packed with a silky floss surrounding the seeds. This floss is used in upholstery for the stuffing of pillows, etc.; the fibre being of too short a staple to be spun. The seeds of the *Kapok Tree* yield a bright red, clear oil, and are also eaten, while the young fruits are said to be used in cookery. The seeds of this tree are made into cakes by the Hindus and used as fodder for their cattle.

In Honolulu the tree is quite often met with; nice specimens may be seen in the grounds of the Board of Agriculture and Forestry, the Queen's Hospital grounds, Mrs. Foster's premises, and around the Capitol building. It can always be recognized by its columnar trunk and horizontal branches. It was introduced into the Island in the early days, probably by Dr. William Hillebrand.

***Adansonia digitata* L.**

Plates LVIII and LIX.

BAOBAB TREE, BOTTLE TREE, MONKEY BREAD, SOUR GOURD.

The *Bottle Tree*, or *Monkey Bread Tree*, known in Honolulu mainly by these names, is one of the largest and longest lived trees in the world. Its trunk reaches larger dimensions than that of any other known tree, often having a diameter of more than thirty feet. It is a native of the West Coast of Africa, where trees several thousand years old can be found on the tree-grass plains, grassy plains with trees scattered great distances apart. It forms, with an *Acacia*, the sole tree growth on the plains of Uganda. Its roots penetrate deeply into the ground, while the fleshy trunk, which possesses little woody substance, is an excellent water reservoir. The *Baobab* be-



Adansonia digitata Linn.

Baobab or Bottle Tree in the Queen's Hospital grounds.

comes bare during the dry season and in the rainy season brings forth leaves and flowers, the latter very large and usually six inches in diameter. The specific name, *digitata*, refers to the five-fingered leaves (*digitus*=finger). It has been introduced into a great many tropical countries, especially into India, where it is plentiful on the coasts of Bombay and Madras. In Honolulu there are only a few trees; the most noteworthy are the one growing in the grounds of the Board of Agriculture and Forestry and another (here figured) in the Queen's Hospital grounds near the Vineyard Street entrance.

In Africa it extends from the Senegal to Abyssinia. It has been termed "the oldest organic monument of our planet." Adanson, a famous French traveler who lived in Senegal from 1749 to 1754, and after whom the tree is named, calculated that a tree thirty feet in diameter was over five thousand years of age. He saw trees five to six feet in diameter, on the barks of which were cut European names, one dated in the fourteenth and another in the fifteenth century.

When the bark is bruised it exudes a large quantity of white, semifluid, odorless and tasteless gum. The bark yields a strong and useful fibre, and the tree has on that account been urged for cultivation. In Senegal it is made into rope and even woven into cloth by negroes, who also make canoes from the very soft wood. Small trees yield finer fibre than old ones. The fibre is exported and manufactured into paper especially suitable for bank notes. The leaves, bark, and especially the fruit, abound in mucilage. The pulp of the fruit has a pleasant, cool taste, and is a good refrigerant in fever. The negroes powder the dry leaves, which they call *lalo*, and use for excessive perspiration. The fruit varies in size and shape. It often reaches a length of more than twelve inches and a diameter of three to four inches, but occasionally has the shape of a gourd. It contains many brown seeds, is slightly acid, and produces a rather pleasant drink. The negroes eat the fruits. Owing to the softness of the wood of the *Baobab*, the trees are often hollowed out by the natives of Africa and used for dwelling houses; one of the trees has been found sufficiently large to accommodate about thirty people. The natives employ the ashes of the fruits and bark, boiled in oil, as soap.

The genus *Adansonia* contains three species, the one discussed here, one peculiar to Madagascar, and a third known only from North Australia, where it is called *Sour-Cucumber Tree*, on account of its fruits.



Sterculia urens Roxb.

Fruiting specimen.

STERCULIACEAE

CACAO FAMILY.

Besides the species treated below, mention must be made of the *Cacao*, or *Chocolate Tree*, *Theobroma cacao* L., a native of tropical America and cultivated in Honolulu but not commercially since the early fifties. Specimens occur at Ahuimanu Ranch on Oahu, as well as in Dr. Hillebrand's garden on Nuuanu Avenue.

A species of *Pterospermum* is also in cultivation in Honolulu, but only in Mrs. Foster's grounds. One young seedling has been planted on the College of Hawaii Campus. It has a rather handsome foliage which is white underneath. The tree in Mrs. Foster's grounds was cut down, but young ones have come up again, as well as shoots from the old trunk. As there are no flowers or fruits available, the species cannot be definitely determined, but will probably prove to be *Pterospermum suberifolium* Lam., a native of India. It was introduced by Dr. Hillebrand.

***Sterculia urens* Roxb.**

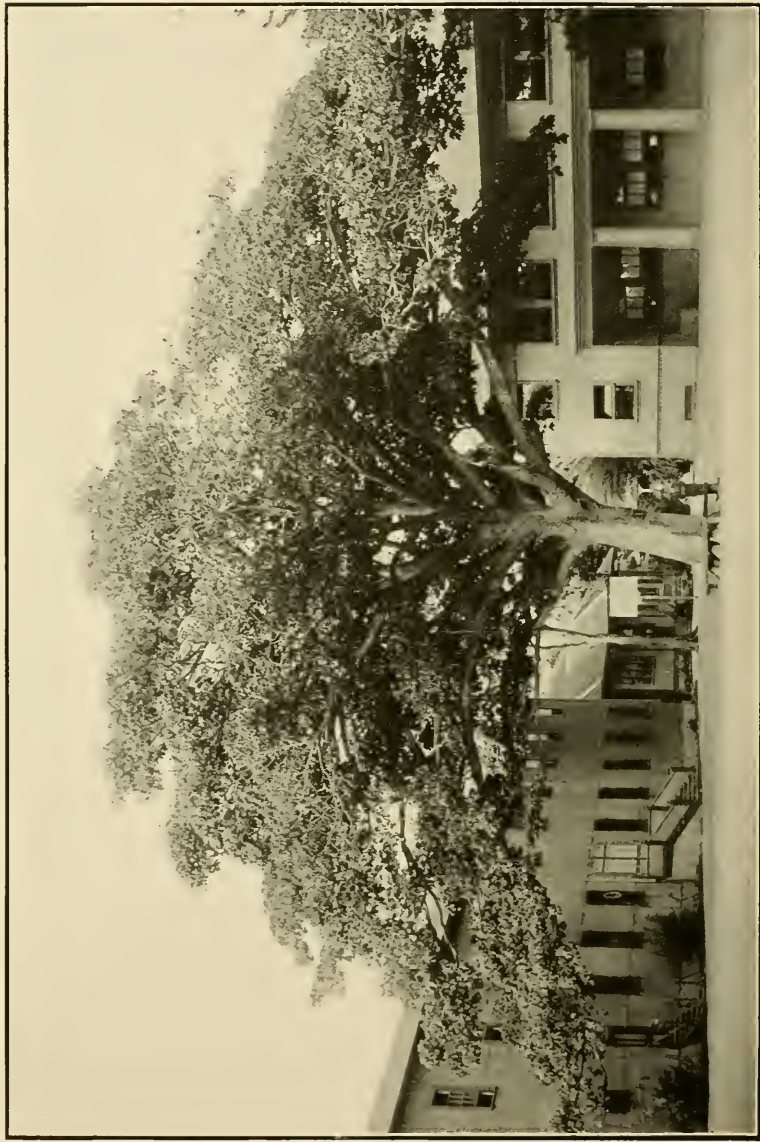
Plates LX and LXI.

Sterculia urens is a large deciduous tree, with smooth bark of a whitish or greenish-gray color, which exfoliates in large, thin, irregular scales, the outer bark is papery, the inner fibrous. The trunk is erect and soft-wooded. Its branches are wide spreading and marked with large scars. The leaves are terminal and palmately five-lobed, heart-shaped at the base, almost smooth above and tomentose underneath. The flowers are borne in crowded, erect, somewhat pyramidal, panicles, and are densely clothed with glandular hair. The fruit consists of four to five radiating, thick, leathery carpels, about three inches long, which are red at maturity and covered outside with stiff, stinging hairs; each carpel contains three to six seeds of a dark brown color.

Sterculia urens is a native of both Indies and also Ceylon, occurring mainly in the northwestern part of India and Assam to Burmah. It yields a gum which is completely soluble in water, forms a colorless solution, and is equal to tragacanth as an emulsifying agent. It is used medicinally as a substitute for tragacanth in throat affections in its native home.

The bark yields a good fibre which is used in rope-making. The seeds possess cathartic properties but are often eaten by the poorer

Plate LXI.



A huge specimen of *Sterculia urens* Roxb, growing in St. Louis College grounds.

natives of India; sometimes they are ground and made into a sort of coffee.

Sterculia urens has been planted quite frequently in Honolulu where space permitted it. The finest specimen may be seen in the grounds of St. Louis College, others in Thomas Square, facing Bere-tania Street and also in private grounds on Emma Street.

***Sterculia foetida* Linn.**

Sterculia foetida is also a large deciduous tree, with a tall, stout trunk and horizontal, whorled branches; the leaves are crowded at their ends, are digitate, consisting of seven to nine elliptical-lanceolate leaflets. The flowers are arranged in raceme-like panicles six to twelve inches long; they are red and yellow or dull purple and have a most offensive odor which attracts carrion flies, which often deposit their eggs on them. The fruit consists of scarlet woody follicles, nearly glabrous outside but fibrous inside, containing ten to fifteen seeds in each. It is of much wider distribution than *Sterculia urens*, extending from western and southern India to Burmah, East tropical Africa, the Moluccas, and North Australia. Like the foregoing species, it exudes a gum resembling tragacanth. The leaves are used medicinally; the seeds are oily, containing about forty per cent of a fixed thick, pale yellow oil; they are eaten by the natives of the various countries in which this species is indigenous, but when swallowed incautiously bring on nausea and vertigo.

Occasionally the wood is used for house building and in the construction of masts and canoes. In Honolulu it is less commonly planted than *Sterculia urens*, probably on account of the offensive smell of its flowers. Trees of this species may be found in Moanalua Gardens, opposite the Pleasanton Hotel on Punahou Street, and probably elsewhere. It is of more recent introduction than the preceding species.

***Brachychiton acerifolium* F. v. M.**

FLAME TREE.

Plate LXII.

The *Flame Tree* is quite glabrous; its leaves are long petioled, deeply five to seven lobed, the lobes oblong to lanceolate often sinuate, the whole leaf eight or ten inches in diameter. The rich red flowers are arranged in loose axillary racemes or panicles. The follicles are



Brachychiton acerifolium F. v. Muell.

Australian Flame Tree.
Flowering specimen.

large, on long stalks, and black when mature. The tree grows to large dimensions. It is a native of New South Wales, but can be found in cultivation in both tropical and subtropical countries. The wood is occasionally used for timber. Honolulu has only a few specimens, the best ones occurring in the grounds of the Board of Agriculture and Forestry on King and Keeaumoku Streets. Mention must be made of *Heritiera littoralis* Dryand, of which there are only about two trees in the Territory, one a straggly looking specimen in St. Louis College grounds near the entrance. It is a medium-sized tree with dark red heartwood which is very hard and has reddish medullary rays. The leaves are leathery, elliptical-oblong and entire. The flowering panicles are shorter than the leaves, the flowers very small. The ripe carpels, one to three, are woody, glabrous, shining, and have a strong sharp keel. It is a tropical seashore tree and is distributed from Burmah to the Andaman Islands, Ceylon, the tropics of the old world and Australia. The wood is used for houseposts and rafters and also for firewood. It has received the name *Looking-Glass Tree* by Europeans, owing to the dense silvery hairs which cover the under surface of the leaves.

***Brachychiton discolor* F. v. Muell.**

Plate LXIII.

This peculiar species of the genus *Brachychiton* is ordinarily a tall tree with the young shoots tomentose. The leaves are broadly cordate, shortly pointed at the apex, angular or shortly and irregularly five or seven lobed, glabrous above, whitish underneath, with a close tomentum, and are about four to six inches in diameter. The flowers are borne clustered in the axils of the upper leaves. The calyx is about one and a half inches long, bell-shaped and colored (the petals being wanting), tomentose inside and out, and is divided to the middle into broad lobes with induplicate margins. The fruit consists of follicles which are woody in this species, about four to six inches long, pointed, and are densely rusty-tomentose outside.

This species, which has no common name, is a native of Australia, occurring in the northern part of that continent, in Queensland and New South Wales. In Honolulu there is only a single specimen; it was introduced by the late Mr. Jaeger, in whose premises it grows. It flowers in the late fall.



Brachychiton discolor F. v. Muell.
Flowering and fruiting specimen.

Guazuma ulmifolia Lam.

GUAZIMA OR GUASIMA, THE BASTARD CEDAR.

The genus *Guazuma* possesses four species, of which the one here cited is the most common, all are natives of Central and South America.

The *Guazima*, as the tree is called throughout the Antilles, reaches a height of forty feet and has a rather straight trunk. The leaves are simple, (undivided), serrate, and stellate hairy, especially on the under side. The flowers are small and rather insignificant; the fruit is woody and covered with stout, short spines. It is undoubtedly a native of the West Indies, but has long been in cultivation in the warmer parts of India and Ceylon. In Honolulu there seem to be only a few trees of this species; one grows in the Government Nursery grounds on King Street, and another in Mrs. M. E. Foster's premises.

The wood of the *Bastard Cedar* is rather loose grained, of a brownish color, streaked, and somewhat coarsely fibrous. It is occasionally employed in India for furniture, panels of carriages, and packing cases. The young luxuriant branches yield a fibre of considerable strength, useful for rope-making.

The tree has medicinal properties which have been employed in Martinique. The infusion of the old bark is esteemed as useful in diseases of the chest. The inner bark is cut into small pieces, boiled in water, and strained when cool, the dose is from two to three fluid ounces. In the West Indies a similar decoction is used as a remedy for Elephantiasis.

It is also stated that the glutinous decoction of the inner bark is employed in the West Indies for clarifying sugar, while the wood is used as fuel and the light charcoal in the manufacture of powder.

In Southern India the tree has been planted mainly in avenues, for which it seems admirably adapted.

Kleinhofia hospita L.

Plate LXIV.

The genus *Kleinhofia* consists of a single species, which is a handsome tree twenty-five to forty-five feet or more in height. The leaves are broadly ovate, pointed, five to seven nerved, heart-shaped at the base, about four inches each way, with leaf stalks half as long. The flowering panicles are ample and large and bear small pink- or rose-colored flowers; the capsule is about an inch long, inflated, pear-



Kleinhofia hospita L.

Flowering and fruiting specimen.

shaped, thin, papery, and is divided into five valves, each valve containing a single seed.

This rather handsome tree is a native of the Eastern and Western Peninsulas of India and is distributed over Malacca, Formosa, Singapore, Ceylon, Java, the Philippines, and Eastern Africa. It flowers from August to November.

In Honolulu there are only two mature specimens, one on the corner of Beretania and Union Streets, the other, a very tall tree, on King Street near the Y. W. C. A. Homestead.

It thrives well in low, moist countries and is well suited for planting along avenues. It has been used for this purpose in Calcutta and in the Bombay Presidency. The old timber of this species is much valued in Java, though no information is available as to its uses. Seemann reports this tree as indigenous in Fiji on Vanua Levu, where it is known to the natives as *Mamakara*.

GUTTIFERAE

MANGOSTEEN FAMILY.

Species under cultivation belonging to this family are as follows: *Garcinia mangostana* L., the *Mangosteen*, a single tree on the Island of Kauai, and one other on Maui are the only ones in the Territory. *Garcinia Xanthochymus* Hook. f., a moderate-sized tree of pyramidal stature, with dark green foliage and yellow fruits, is quite commonly planted. It was first introduced by Mr. Albert Jaeger. It is a native of India, Burmah and the Andaman Islands.

Calophyllum inophyllum L., the true *Kamani*, is also common. It is indigenous in these islands and is therefore treated in the writer's book on the "Indigenous Trees of the Hawaiian Islands." *Cratoxylum polyanthum* Korth. var. *ligustrinum* Bl. a glabrous aromatic shrub a native of tropical Asia is under cultivation in Honolulu. The writer knows of a single specimen in the Queen's Hospital grounds near the Vineyard Street entrance.

BIXACEAE

The family *Bixaceae* consists of a single genus with a single species, which is sparingly cultivated in Honolulu. The very closely related family *Cochlospermaceae*, once classed with the *Bixaceae*, has a single species represented of the genus *Cochlospermum*.

Plate LXV.



Cochlospermum balicum Boerl.

Bixa orellana Linn.

ANATTO.

The *Anatto* is a small tree or shrub of handsome appearance. The leaves are ovate, cordate, and have a pointed apex. The flowers are white or pink, quite numerous, and are followed by burr-like ovoid capsules, at first green but later changing to a deep red, and are covered with slender, soft spines. The seeds are covered with an arrillus of a bright orange-red color, which constitutes the *Anatto* of commerce.

It is a native of tropical America, but is now widely distributed in the tropics of the world. The arrillus is often removed from the seeds while fresh and compacted into cakes, in which form it is exported into the United States for manufacture into butter color. Over seven hundred thousand pounds were annually imported, valued above fifty-four thousand dollars, but lately aniline dyes have supplanted it. Only a few specimens, mostly shrubby in appearance, may be found in Honolulu, especially on Nuuanu Avenue in private grounds.

Cochlospermum Balicum Boerl.

Plate LXV.

This rather handsome species here illustrated is a native of the East Indies and is under cultivation in Java, where the writer saw it in the Botanic Gardens of Buitenzorg. Its large, handsome, bright yellow flowers give it a very ornamental aspect. The leaves are, however, subject to insect attacks and have a dilapidated appearance.

It is probably related to *C. hibiscoides* and *C. vitifolium*. Only a single tree is at present under cultivation in Honolulu, in Mr. G. P. Wilder's grounds.

FLACOURTIACEAE

FLACOURTIA FAMILY.

This family, which consists of about 550 species, is distributed over most tropical countries and is represented in Honolulu by two introduced species belonging to the genus *Flacourtia*, *Flacourtia sepiaria* and *Fl. Jangomas*, the latter known as *Fl. Cataphracta* Roxb., which name is a synonym. Both species have edible fruits which are of the size and color of a cherry. They may be found in Mrs. M. E. Foster's premises. Of the latter species one tree occurs also on the Old Plantation grounds on King Street.

Pangium edule Reinw., a fruit tree, has also been introduced.

CACTACEAE

CACTUS FAMILY.

While this family does not come within the scope of this work, mention must be made of *Cercus triangularis* (Linn.) Haw., the *Night-blooming Cercus*, a native of Mexico, remarkable for its large white flowers and red, quite palatable fruits. Cultivated extensively in the islands, the finest specimens may be seen on the stone wall enclosing the Punahou Campus. It may not be out of place to mention *Carica papaya* L., the *Papaya*, which, next to the Pineapple, is the most extensively cultivated fruit in the Territory. The first *Papaya* tree in these Islands was probably one planted by Mr. G. Wundenberg at Hanalei in 1848.

LYTHRACEAE

HENNA FAMILY.

This rather large family is represented in these Islands by several species, two of which are of striking beauty and are discussed in the last two chapters.

Lawsonia inermis L.

HENNA.

The *Henna* is an erect, much branched shrub, ten to eighteen feet in height; the leaves are oblong-elliptical, pointed, and about an inch or more long; the flowering panicle is ten to twelve inches long and its lower branches are subtended by leaves; the flowers are very fragrant, rather small, and usually straw-yellow; the fruit is a depressed globose capsule a few lines in diameter.

Henna is commonly cultivated for its fragrant flowers in many tropical countries; it is a native of Africa and India, but may now be found well distributed over the tropics. It is the only species of the genus *Lawsonia*; the latter having been named in honor of Dr. J. Lawson, a Scotch friend of Linnaeus.

It is cultivated in many provinces of India for the sake of its dye and fragrant flowers, and partly as a hedge plant. The natives of India employ a decoction of the leaves in dyeing cloth, the color produced being a shade of yellow or reddish-brown, which is known as *Malagiri*. The most important use of *Henna* in India is as an article of toilet; the leaves being used for staining the fingers, nails, hands and feet, and for dyeing the hair. The custom is a very old

one among the Mohammedan population of the world, dating back to the earliest times, as is shown by ancient mummies. The seeds yield a little known oil, while the flowers are used in perfumery and embalming. The ancient Egyptians used the flowers to perfume the oils and ointments used in embalming.

Medicinally the *Henna* has been employed from the remotest times. The Egyptians used it as an astringent; Persian writers describe the leaves as a valuable external application in headaches. If applied to the hair and nails they have the reputation of promoting healthy growth.

The only chemical substance of medicinal value known to be contained in *Henna* is an astringent principle which has been termed *Hennotannic Acid*.

Only very few *Henna* shrubs can be found in Honolulu as it is not cultivated or much known by the people of these Islands. A handsome *Henna* plant can be seen in the Government Nursery grounds on King Street. It is well adapted for hedge planting and would be worthy of cultivation.

***Lagerstroemia speciosa* (L.) Pers.**

Plate LXVI.

Lagerstroemia speciosa is a medium to large-sized tree reaching often a height of sixty feet, but flowers when a mere shrub six feet in height. The leaves are leathery, oblong, and obtuse or shortly pointed. The large flowering panicle is terminal, and up to a foot and a half in length. The flowers are lilac-purple and of exquisite beauty. The capsules are obovoid or ellipsoidal and contain many seeds, which are winged at the apex.

This large deciduous tree is a native of Eastern Bengal, Assam and Burmah, ranging as far as Australia.

Owing to its large panicles of beautiful lilac flowers it is now cultivated in many tropical countries, but curiously enough only sparingly in Honolulu. The finest specimen may be found in Dr. W. Hillebrand's garden on Nuuanu Avenue, where it flowers during the fall, producing afterward an abundance of capsules.

The wood is light red in color, and is one of the most valuable timbers of India and Burmah, where it is valued next to *Teak*. It is used in the construction of ships, boats and canoes, and also for building purposes. It is very durable under water but decays under ground. The root is astringent, while the seeds are narcotic and the leaves are said to be purgative.



Lagerstroemia speciosa (L.) Pers.

A species of Crape Myrtle; flowering branch.

Another very handsome species is *Lagerstroemia indica* Linn., the *Crape Myrtle*. It is, however, not a tree, but a shrub twelve to fifteen feet in height, with slender, four-angled branches, which are narrowly winged; the leaves are much smaller than in the foregoing species. The flowers are very showy, pink or purplish and are arranged in small terminal panicles. The capsule is also smaller.

The *Crape Myrtle* is a native of China, but has been widely cultivated. In Honolulu it is much more common than the foregoing species, but still not plentiful. Both species certainly deserve to be more generally cultivated. It is a profuse bloomer and is most easily cultivated from seed as well as cuttings. It blossoms during a period of two or three months beginning usually in June. Specimens may be seen on Nuuanu Street, also on Keeaumoku Street, and elsewhere. It was named in honor of Magnus v. Lagerstroem (1696-1759), a friend of Linnaeus.

Of the *Punicaceae* or *Pomegranate* family, which consists of a single genus with two species, only the common *Pomegranate*, *Punica granatum* L., is under cultivation. It is a native of eastern sub-tropical Asia.

LECYTHIDACEAE

BARRINGTONIA FAMILY.

Formerly the members of this family were classed with the *Myrtaceae*, with which it has, however, little in common. It is much closer to the Mangrove Family (*Rhizophoraceae*), through *Barringtonia* on one side and to the *Blattiaceae* through the genus *Foetidia* on the other.

The genus *Barringtonia* only is represented by two species.

***Barringtonia asiatica* (L.) Kurz.**

(Syn. BARRINGTONIA SPECIOSA Forst.)

Plate LXVII.

The *Barringtonia asiatica* is a large, handsome tree with thick, leathery, glossy, bright green wedge-shaped leaves which are glabrous; the flowers are quite conspicuous, having four white petals and numerous crimson-tipped stamens, resembling a brush; the fruit has the shape of a four-sided pyramid, is quite large and consists, when dry, of a solid fibrous case, which is smooth outside and contains one seed. This fibrous case enables the fruits to float, and as it is quite thick and solid, it protects the seed from coming into contact with salt water, thus keeping its germinating power from being destroyed.



Barringtonia asiatica (L.) Kurz.

Fruiting branch.

The tree is decidedly a beach tree and forms extensive beach forests in some of the Pacific islands. It depends on the ocean current for its dispersal, hence its wide distribution. It is a native of the Andaman Islands, Singapore, Ceylon, Guam, Samoa, the Philippines and other countries bordering on the Pacific, but not of Hawaii.

In the Moluccas a lamp-oil is expressed from the seeds, while a drug is prepared from the bark; the active principle appears to be a volatile oil combined with resin; the drug is a narcotic and is used by the natives of the various countries above-mentioned in stupefying fish. The dry fruits are also gathered by the natives and used as fishing floats, in place of cork. There are quite a number of trees planted about Honolulu, the largest occurring in Mrs. Foster's grounds on Nuuanu Avenue. A few have been planted on Beretania Street and a fine specimen may be seen in the grounds of the University Club.

Another species of *Barringtonia* under cultivation is *B. racemosa* Roxb., a smaller tree, with long drooping racemes of white or pink flowers. The single specimen in Honolulu was planted by Dr. W. Hillebrand on his premises. This species is a native of India, Ceylon and Polynesia, flourishing on open lowlands near the sea.

COMBRETACEAE

TERMINALIA FAMILY.

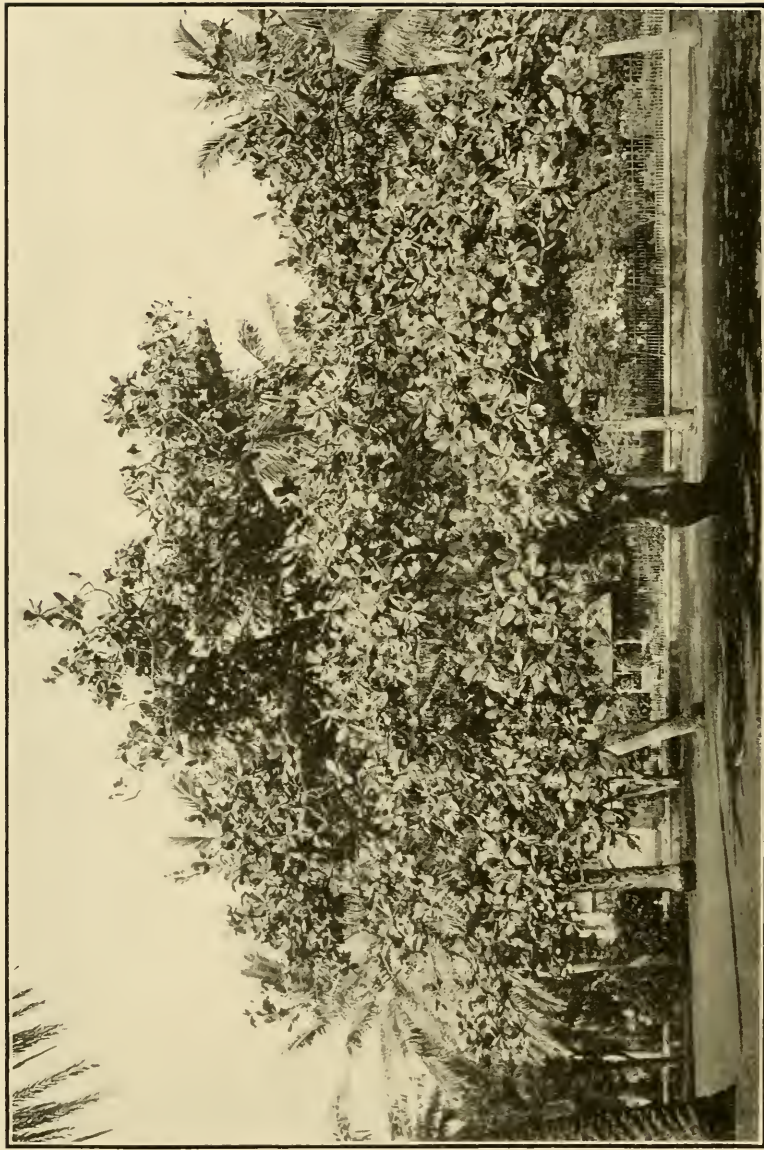
The *Terminalia* family comprises about 250 species, with the following in cultivation in Honolulu.

***Terminalia catappa* L.**

UMBRELLA TREE, FALSE KAMANI, INDIAN ALMOND.

Plate LXVIII.

The so-called *Kamani* is a large tree, which sometimes reaches a height of seventy-five feet. The branches are long and spreading, horizontal, or nearly so. In its young state the branches are somewhat turned upward, resembling an inverted umbrella, whence the name. The leaves are large, obovate, shining, and taper below to a narrow and cordate base, and finally into a short petiole. The small white flowers are arranged in spikes, the latter are axillary, simple and up to seven inches in length. The fruit is one-seeded, compressed, ellipsoidal in outline, prominently two-ridged, and up to two inches or more in length. The *Umbrella* or *Kamani Tree*



Terminalia catappa L.

False Kamani Tree in the Capitol grounds.

is of wide distribution, occurring in the Philippines and extending to India and Malay. It was introduced into these Islands many decades ago and is now very commonly planted as a shade tree. In the autumn the leaves turn red and drop off, but are soon followed by the bright green, shining young foliage. It is decidedly a tree of the seashore and grows very rapidly in good, light, sandy soil.

The tree yields a gum which is known in the West Indies as almond gum. The bark and leaves are astringent and contain tannin up to 9 per cent. The kernels yield a valuable oil which resembles almond oil in flavor and odor, and does not become rancid so readily as the true almond oil. The kernel may also be eaten; it is quite palatable and fairly nutritious.

The wood is reddish and rather soft, and may be used for posts.

Terminalia Chebula Retz.

BLACK MYROBALAN.

The *Black Myrobalan* is a large deciduous tree, abundant in Northern India. It is a very polymorphic species, the most variable part being the fruit. In India the tree ascends to an elevation of 5000 feet in the sub-Himalayan tracts. The dried fruit forms the myrobalan of commerce and is considered one of the most valuable tanning materials in India. There is only a single tree in Honolulu, on the premises of 1814 Ahuula Street.

Quite a number of other species of *Terminalia* have been introduced, as for example, *Terminalia sumatrana*, *T. arborea*, and others. A vine belonging to the genus *Quisqualis*, *Q. indica* L., is also in cultivation, but rather rare.

MYRTACEAE

MYRTLE FAMILY.

This rather large family consists of about 3000 species and is represented in the Islands by quite a large number of species, mostly fruit trees rather than ornamental trees. As the former have already been treated to some extent by Mr. G. P. Wilder, they are simply mentioned here. Of the genus *Eucalyptus* about 80 species are cultivated, but mostly in the uplands, and as they are not exactly of ornamental value, they are here omitted. The most common and now naturalized member of this family in the Islands is the *Guava*, *Psidium Guayava* L., a native of Mexico. Its introduction is to be accredited to Don Marin, a Spaniard who came to the Islands in

1791. Numerous *Eugenias* are also in cultivation, as *Eugenia Jambolana* Lam., *E. Jambos* L., *E. brasiliensis* Lam., *E. uniflora* L., *E. malaccensis* L.; several other species of *Psidium*, as *P. cattleianum* Sab., and the several forms of *P. Guayava*, as *pyriferum* and *pomiferum*.

Myrtus communis L., the common *Myrtle*, may also be found, specimens occurring at Kaimuki near 10th Avenue and Waialae Road.

The most commonly planted *Eucalypti* are: *E. globulus*, *E. robusta*, *E. calophylla* and *E. citriodora*. The writer would refer anyone especially interested in Eucalyptus to a Bulletin on the Eucalyptus Culture in Hawaii, by Louis Margolin, published by the Board of Agriculture and Forestry. It treats mainly of the commercial possibilities of a few species. The determinations made by Margolin are, however, not reliable.

Syncarpia glomulifera (Sm.), known as *S. laurifolia*, the latter name a synonym, is also under cultivation; but on the highlands only. It is a native of New South Wales. Species of *Melaleuca* are also grown, the most noteworthy being *M. leucadendron* L., the Cajeput Tree. The Allspice *Pimenta officinalis* Lindl. is an evergreen tree, native of the West Indies. Specimens are also in cultivation in Honolulu.

ARALIACEAE

ARALIA FAMILY.

The *Aralia* family is composed of 54 genera and 650 species, with the following cultivated in the Hawaiian Islands:

Nothopanax Guilfoylei (C. et M.) Merrill

Nothopanax Guilfoylei, which, unhappily, has no common name, is an erect shrub with straight ascending branches, and reaches a height of twelve feet or more. The leaves are pinnate, having from five to seven large ovate leaflets, with the margins distantly but prominently and sharply serrate; the apex is rounded, the base somewhat uneven, the margins white, and the upper leaf surface also frequently blotched with white.

This species has never flowered in Honolulu, where it is one of the most common hedge plants. It is a native of Polynesia, but is now widely cultivated. It grows very easily from cuttings and is one of the most satisfactory and clean hedge plants, as it is not at all attacked by insects.

Nothopanax fruticosum (L.) Miq.

Nothopanax fruticosum, less commonly seen than the foregoing species, is a shrub three to seven feet in height with decomposed three pinnate leaves. The leaflets and ultimate segments are usually very diverse in form, are pointed and sharply spinulously toothed to even lobed; they are of a uniform yellowish-green color. The inflorescence is terminal, the flowers are numerous, and arranged in umbels. It is a very variable species and flowers commonly in Honolulu. It is probably a native of Polynesia.

In Honolulu it is rarely or never planted as a hedge, and when planted singly assumes the form of a large globose bush. Fine specimens may be seen in the Pleasanton Hotel grounds.

Other species belonging to this genus are *Nothopanax cochleatum* (Lam.) Miq., an erect shrub up to nine feet or more in height with simple suborbicular, somewhat concave saucer-like leaves. It is very common in Guam and the Philippines, but rare in Honolulu. Specimens occur on the premises of Mr. G. P. Wilder and the College of Hawaii grounds.

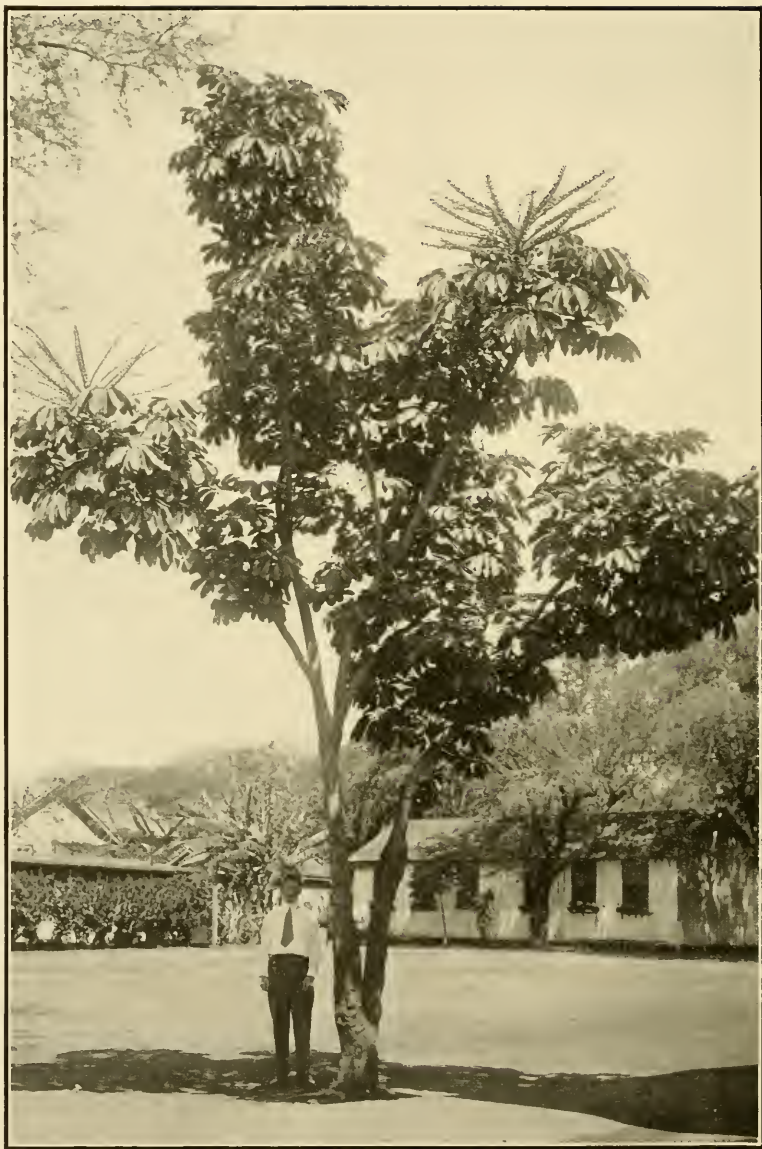
Nothopanax ornatum, probably also *N. pinnatum*, and on or two varieties of *N. fruticosum*, as variety *victoriae* Hort., are also in cultivation but not at all common.

Brassaia actinophylla Endl.

Plate LXIX.

Brassaia actinophylla is a handsome tree which attains a height of forty feet. The leaves are composed of seven to sixteen leaflets, which are stalked, oblong or obovate-oblong in outline, leathery, and entire. The flowers are arranged in little dense heads along the stout rhachis of racemes several feet in length, and of which there are often several together at the end of the branch. The inflorescence is red, and the fruits contain about twelve one-seeded laterally compressed pyrenes, and are dark purplish-black in color.

The genus *Brassaia* consists of this single species, which is peculiar to Australia. It is extensively cultivated in Honolulu and grows from cuttings as well as from seed. It makes an admirable pot-plant in its young state and is quite ornamental as a tree. It is immune to insect attacks, and when in flower is quite a showy object.



Brassaia actinophylla F. v. Muell.

On the Kaahumanu School grounds, Beretania Street.

MYRSINACEAE

ARDISIA FAMILY.

The *Ardisia* family possesses 33 genera and nearly 1100 species; the genus *Ardisia* is only represented by two cultivated species.

***Ardisia humilis* Vahl.**

Ardisia humilis is a shrub six to ten feet in height, with thick, fleshy glabrous branches; the leaves are obovate oblong, acute at the base and rounded at the apex, thick, fleshy and smooth on both sides, and are on very short leaf stalks. The inflorescence is glabrous, drooping and shorter than the leaves. The flowers are pinkish-purple with small black dots dispersed over the surface of the petals and sepals; the berry is subglobose and dark purple.

This species is a native of the East Indies, extending over Burmah to Southern China, the Philippines and neighboring islands. It is cultivated on account of its pretty purplish flowers, and clean, glossy leaves. In Honolulu specimens occur in Mrs. M. E. Foster's premises. Another species, *A. solanacea* Roxb., a native of India (in the tropical regions of the East Himalayas), is perhaps identical with the foregoing species, with which it is united by several authors, save C. Mez, who considers it a separate species in his monograph on the Myrsinaceae. It does in fact differ from *A. humilis* in the petals, which are obtuse and not acuminate, and in the anthers, which are smooth and not rugose and dotted as in *A. humilis*. The leaves are obovate-oblong, acute and not obtuse at the apex.

Fine specimens of this species may be found in the grounds of the Government Nursery on King Street, and in Mrs. M. E. Foster's premises.

The family *Plumbaginaceae* is represented by the blue-flowered *Plumbago auriculata* Lam., commonly known as *P. capensis* Thunb., which is a synonym. It is a native of South Africa, but now commonly cultivated.

SAPOTACEAE

GUTTAPERCHA FAMILY.

The *Sapotaceae* include quite a number of fruit trees, some of which are cultivated in the Islands, as for example, *Achras sapota* L., the Chico of Mexico, a species of *Bumelia*, *Chrysophyllum Cainito* L. the Star-apple, and *Chrysophyllum monopyrenum* Sw. the so-called Damascene Plum. Of interest here is *Mimusops elengi* L., a tree reaching a height of forty-five feet. The leaves are green, shining, elliptic and glabrous; the flowers are axillary, solitary, in pairs or fascicled and fragrant; the corolla is white. The fruit is ovoid, about an inch or less long, one- or rarely two-seeded. It is occasionally cultivated and specimens may be seen in the Government Nursery, in the Hilo court yard and elsewhere. It is a native of India, where it is cultivated. It yields a gum known as Madras gum, while the fruits are used medicinally in diseases of the gums and teeth. A volatile oil is distilled from the flowers, while a fixed oil is obtained from the seeds by compression which is used for culinary purposes and is also burned in lamps. It is supposed to be sacred to the Mohammedans of southern India.

The *Ebenaceae* or *Ebony* family is represented by only a single species, belonging to the genus *Diospyros*, *D. Ebenaster* Retz, which produces a large, globose, edible fruit, nearly black when ripe. The fruit flesh is brownish.

It is a native of Mexico and is cultivated on the Island of Oahu only on the windward side, below the Pali. It has been erroneously recorded as *Diospyros decandra* by G. P. Wilder.

OLEACEAE

OLIVE FAMILY.

Besides the species treated below, there are represented in Hawaii the true *Olive*, *Olea europea* L., which rarely bears seed; *Osmanthus fragrans* Lour., a small shrub or tree whose native home is East India, and *Fraxinus floribunda* Wall, introduced by the writer from the Eastern Himalaya, where it is a large tree. Specimens have been planted out in upper Makiki Valley. Another species of *Fraxinus* grows on Union Street, back of the Pacific Club. This latter Ash tree belongs to the section *Fraxinaster*, but as only a single male tree is in cultivation, the species has not been definitely determined.

Noronhia emarginata Toir., the only species of the genus *Noronhia*, a native of Madagascar and Timor, is cultivated in Honolulu.

It produces edible fruits. A single tree grows in the Government Nursery grounds. The Japanese privet, *Ligustrum ovalifolium* Hassk., is also in cultivation besides *Jasminum multiflorum* (Burm.) Roth., the Star Jasmin, trained over fences and pergolas; it is in blossom all the year round.

***Linociera intermedia* Wight.**

var. ***Roxburghii* C. B. Clark**

The variety *Roxburghii* of *Linociera intermedia*, C. B. Clark, also known as *Olea paniculata* Roxb., is a medium-sized tree with papery leaves six and a half by two and a half inches, which are on petioles of a half to one inch. The flowering panicle varies from two to five inches in length, and has compressed branches. The flowers are white and consist of four petals and two elliptical, shorter stamens. The fruit is of the shape of an olive, glaucous and about half an inch or less long.

This species is a native of India, where it occurs in the Nilgherry hills up to an elevation of 6000 feet. There are very few trees of this species in Honolulu; one is in Mrs. Jaeger's premises. There is also a specimen in Hilo. The wood is pale brown, hard, close grained and durable, and is valued in the manufacture of agricultural implements.

LOGANIACEAE

STRYCHNINE FAMILY.

Besides the following species there is in cultivation a species of *Fagraea* with long tubular, white, fragrant flowers. A single tree grows at the Maunwili Ranch on the windward side of Oahu.

***Strychnos nux-vomica* L.**

THE NUX-VOMICA OR STRYCHNINE TREE.

The *Strychnine Tree*, which attains the height of forty feet, is a native of India, and is found throughout tropical India, being rare in Bengal but very common in the Madras Presidency and Tennesserim. It can be found up to an altitude of 4000 feet. The leaves are three and one-half by two inches, ovate and five-nerved, are glabrous, and have short leaf stalks. The floral cymes are terminal, short stalked and bear many flowers; the fruit resembles very much a Chinese orange or Mandarin, being of the same color when ripe. It is one and one-half inches in diameter, and contains many white,

flat, disc-shaped seeds. The seeds, from which is produced the strychnine of commerce, yield also a dye used for producing light brown shades on cotton.

Nux-vomica entered into European medicine about the middle of the sixteenth century and was first accurately described by Valerius Cordus. About 1640 it was used chiefly for poisoning cats, dogs, crows and ravens, and has only been employed medicinally, as a nerve tonic, since the beginning of the nineteenth century. The alkaloid strychnine is extracted from the seeds mainly, but this substance seems to exist also in the wood and root of the tree, and even plants growing parasitically on it absorb and contain these same alkaloid properties, mainly in their leaves. The strychnine preparations are mainly used in nervous disorders as a tonic and stimulant, for example, in phthisis as a respiratory stimulant and in chronic constipation from weakness of the bowels.

The gathered seeds are freed of the pulp, washed and dried and are then ready for export. The seeds contain two alkaloids—strychnine and brucine—whose characters are amply described in works on *materia medica*.

The pulp of the fruit, though also containing strychnine, is eagerly devoured by birds without apparent harm. In the Nilgherry hills in India the native tribes use the seeds as a fish poison.

The wood is brownish-gray, rather hard and close grained, but splits in seasoning; in Burmah it is used for carts and agricultural implements as well as for cabinet work.

In Honolulu there are only a very few trees, one in the Government Nursery grounds and a few in Mrs. Foster's premises on Nuuanu Avenue, planted by Dr. W. Hillebrand, evidently in the early seventies if not earlier. They bear an abundance of fruit in the month of March.

APOCYNACEAE

PLUMIERA FAMILY.

The *Plumiera* or *Plumeria* family possesses about 1300 species, which are distributed in 32 genera. The following are representatives of nine genera.

Mention may be made of several vines and a small perennial, as for example, two yellow-flowering species of *Allamanda*, *A. Hendersonii* Bull. and *A. cathartica* L. The former species differs from the latter in having a much larger corolla, nearly five inches long, twice the length of that of *A. cathartica*. Both are subscandent shrubs.

Trachelospermum divaricatum (Thbg.) K. Sch., commonly known as *Rhynchospermum jasminoides* Lindl., is also cultivated, specimens occurring in Mrs. M. E. Foster's premises.

Lochnera rosea (L.) Reichb., known as *Vinca rosea*, is cultivated generally and may also be found wild as an escape from gardens.

Another vine or liana belonging to this family is *Beaumontia grandiflora* (Roxb.) Wall, a climber of great beauty. It is a native of the Eastern Himalaya and cultivated widely. Some fine specimens occur in Honolulu. It is easily recognized by the large white flowers. Of late *Carissa carandas* L. has also been in cultivation. It has white, fragrant flowers and scarlet, edible fruits, and is a native of Africa.

Of the family *Asclepiadaceae* (Milk-weed family.) *Cryptostegia grandiflora* (Roxb.) R. Br. may be mentioned. It is supposed to be a native of Madagascar, and has pale purple flowers. It is occasionally planted in Honolulu but is not common.

Other climbing species belonging here are: *Hoya carnosa* R. Br., the wax plant, and *Stephanotis floribunda* Brong., with large, white tubular, strong-scented flowers. *Calotropis gigantea* R. Br., the giant milk-weed, a native of India, is of tree-like habit and occasionally planted; the leaves are broad, whitish and woolly beneath; the flowers are rose and purple colored.

***Plumiera acutifolia* Poir.**

TEMPLE FLOWERS, GRAVEYARD FLOWERS, FRANGIPANI.

The *Plumiera* or *Plumeria*, as it is commonly called in Honolulu, is a milky tree nine to twenty feet in height, with fleshy swollen branchlets which are leafy at their tips. The leaves, which appear after the flowering stage, are oblong, narrowed at both ends and eight to sixteen inches long.



Plumiera rubra Linn.

Red Plumiera.
Flowering specimen.

The numerous very fragrant flowers with strangely overlapping corolla-lobes are yellow, or white and yellow, within; the fruit is a linear-oblong or ellipsoid follicle.

This species is one of forty belonging to the genus *Plumiera*, all of which are peculiar to tropical America. It is now commonly cultivated for its fragrant flowers, which bloom nearly all the year round, and is very common about Honolulu, especially in cemeteries. The Hawaiians make leis or wreaths from the flowers by threading them and by pushing one flower into the tube of the other. This *lei* is a favorite with the Honolulu people, who decorate their departing friends with it.

The *Plumiera* is now cultivated in many tropical countries as an ornamental tree. It was found in India growing abundantly as long ago as 1787 by a Dr. Hove, who mentions that the natives used the bark of this tree for intermittent fever as we do cinchona. The leaves when made into a poultice are used to dispel swellings, while the milky juice is employed as a rubefacient in rheumatism. In northern Bengal the milky juice of this tree has been found to be an effectual purgative. Another but rare species, *Plumiera rubra* L., the *Red Plumiera*, a native of tropical America, has been cultivated by Mr. W. M. Giffard. The first specimen was brought to Honolulu from Mexico by Mrs. Paul Neumann and was given to Mr. E. W. Jordan, who turned the specimen over to Mr. W. M. Giffard on whose premises the tree has attained magnificent proportions. See Plate LXX.

The original tree was fertilized in the normal manner by the common hawk-moth, the pollen coming from the yellow variety of *Plumiera acutifolia*, produced seeds, which in turn were planted and thus were obtained the first hybrids which were distributed over the city. Many crosses exist now between the common species and the red one.

***Alstonia scholaris* (L.) R. Br.**

Alstonia scholaris is a tall, glabrous tree reaching a height of over sixty feet, producing an abundance of milky sap. The branches are whorled, the leaves verticillate, leathery, about eight inches long, oblong-obovate, rounded at the apex and pointed at the base. The flowers are arranged in terminal cymes, which are umbellately branched. The small white flowers are numerous and crowded. The follicles are pendulous, slender, cylindrical and eight to sixteen inches long.

It is a widely distributed species, occurring in Africa, tropical



Ochrosia elliptica La Bill.

Fruiting branch.

Asia, Malay and Australia. There are only two trees in the Territory as far as the writer is aware; both may be found in the premises of Dr. W. Hillebrand on Nuuanu Avenue, who is responsible for its introduction to Hawaii. The tree is commercially known as *Dita Bark*, and occurs under various names in India, where it grows in the sub-Himalayan tracts up to 3000 feet elevation. *Dita Bark* is a valuable and highly ornamental tree which deserves to be cultivated. It is used medicinally and is listed in the Pharmacopœia of India. The bark is an astringent and is given as a tonic. The milky juice is applied to ulcers and is also used to restore the tone of the stomach in debility, and the substance known as *Ditain* is considered equal to the best sulphate of quinine, and at the same time is free from the secondary disagreeable symptoms of the latter drug. *Ditain* was first separated from the bark in the form of an uncrystallizable principal, by a druggist in Manila.

***Ochrosia elliptica* La Bill.**

(Syn. *O. CALOCARPA* Miq. *LACTARIA CALOCARPA* Hassk.)

Plate LXXI.

Considerable confusion exists in regard to the nomenclature of this striking species. The writer saw the tree growing in the gardens of Peradenya, Ceylon, under the name of *Ochrosia acuminata*, and was found published in "List of plants grown in the Bot. Gard. of Peradenya," 1888, p. 51 (name only). Dr. Valeton of Java described and figured a species under *O. acuminata* Trimen, which is, however, an entirely different plant, with yellowish-green, pointed fruits. The species here in cultivation has bright scarlet fruits, which have a violet odor, and is identical with *Ochrosia elliptica* La Bill., described from Australia. This latter name Valeton cites doubtfully as a synonym of *Ochrosia calocarpa*, which he figures and declares to be polymorphous species. One figure agrees exactly with our plant. Since *elliptica* is the older specific name it is here retained.

Ochrosia elliptica La Bill. is a small, milky tree with leaves horizontally arranged in whorls of three or four or occasionally opposite, and elliptical in outline. The flowers are cream-colored, fragrant, and are arranged in corymbose cymes. The fruit, which consists of two drupes, is scarlet, each drupe is acuminate and an inch or two long.

When in fruit this tree is quite conspicuous, the scarlet drupes being handsomely contrasted against the green glossy foliage.



Thevetia neriifolia Juss.

Flowering and fruiting specimen of the Yellow Oleander or Be-still Tree.

It is a native of Queensland, Australia, as well as of some of the Pacific islands, as New Caledonia and Fiji. In Hawaii the plant is cultivated, trees occurring at Ainahau at Waikiki, Mrs. Jaeger's premises, on the Government Nursery Grounds and the largest in the garden of the late Dr. W. Hillebrand, who evidently introduced it into these Islands.

***Cerbera odollam* Gaertn.**

Cerbera odollam is a small tree about twenty to twenty-five feet in height, with lanceolate to oblong lanceolate leaves, which are narrowed at both ends. The flowers are arranged in cymes, which are as long as the leaves, the flowers are white, about one and a half inches long, the tube is slender and the lobes spreading. The fruit is borne in pairs more or less united, or singly, and is two and a half inches or more long, ellipsoidal or ovoid in outline.

This very poisonous tree is a cosmopolitan on the seashores of the tropics, occurring in India, China, Malay, Australia and Polynesia. It has been introduced into these Islands a few decades ago. The writer knows of two trees, one on the premises of the grammar school on Emma Street, formerly Princess Ruth Keelikolani's palace, and another on the Government Nursery grounds.

The milky sap and the leaves have been used in India as an emetic, but their use has been condemned, as even moderate quantities possess so much poison as to be dangerous. The nut is also poisonous and narcotic, the green fruits having been employed in India to kill dogs. The kernel of the fruit is considered an irritant poison, which when taken internally produces vomiting and purging and is soon followed by collapse and death. The wood is soft-spongy and gray in color.

***Thevetia neriifolia* Juss.**

BE-STILL TREE, CAMPANILLA, YELLOW OLEANDER.

Plate LXXII.

This very poisonous small tree, erroneously called yellow oleander, reaches a height of fifteen to twenty feet, is much branched and possesses a copious milky sap. The leaves are linear, sessile, and shining. The flowers, which are borne singly in the axils of the leaves and the branches, are bell-shaped, bright yellow, and very fragrant, having the odor of the tea rose. The fruit is a subglobose,

glabrous, shining drupe, an inch in diameter, and becomes black when mature.

It is an ornamental shrub or small tree introduced from tropical America and now cultivated in many tropical countries. It flowers all the year round, and is quite commonly planted in and about Honolulu. It is well naturalized in Bengal and the plains of India.

From the seeds a bright yellow oil is expressed, which burns well without giving off much smoke, it is also of medicinal value, as it contains triolein, tripamitin and tristearin. De Vry obtained, after expression of the oil, from the cake, about four per cent of a beautiful crystallized white glucoside, which he called thevetine; the same substance was obtained from the bark.

The milky juice of this tree is highly poisonous. The bark, which is a cathartic, is also a powerful febrifuge, and was tried in the form of a tincture in various forms of intermittent fever with good results. When given in large doses it is a powerful poison, in smaller doses it acts as an acrid purgative and emetic.

The poison contained in the seeds, juice, and bark, belongs to the class of acro-narotic poisons. Great caution is necessary in all trials with this remedy.

A second species, *Thevetia Iccotli* DC., a native of Mexico, is cultivated in Kapiolani Park. It differs from the foregoing in the larger flowers and the very narrow linear leaves, which are pubescent underneath and are also revolute.

Nerium indicum Mill.

(Syn. **NERIUM ODORUM** Soland.)

OLEANDER.

Nerium indicum differs from *Nerium oleander* of the Mediterranean region in the sweet-scented flowers and ternate leaves. The latter species may also be in cultivation in the Islands, but those which the writer examined belong all to *Nerium indicum*. It is an erect shrub with the leaves in whorls of three to four, they are linear-lanceolate and pointed. The flowers are about two inches across, white, pink, or red, and are quite fragrant. It often produces fruit (two long follicles) quite profusely.

It is a native of India, ranging from Afghanistan to Japan, but is now cultivated in most tropical, subtropical, and even temperate regions. It can be grown from seed, layers and cuttings, and is profusely planted all over Honolulu, as well as on the other islands.

N. oleander, the true Oleander, differs from it in having broader leaves and larger, scentless flowers.

Both species are poisonous; the root is especially poisonous, but considered a remedy in skin diseases. From the root are obtained two bitter principals, known as *Neriodorin*, a substance soluble in chloroform, and *Neriodorein*, a substance soluble in water but not in chloroform. Both are very powerful heart poisons. Overdoses of the roots cause tetanic symptoms, and in case of poisoning the heart action is greatly reduced. The flowers play a religious part among the natives of India who collect them as a sacred offering to Siva.

BORRAGINACEAE

HELIOTROPE FAMILY.

Besides the common Heliotrope, *Heliotropium peruvianum* Linn., the following trees are in cultivation.

***Cordia sebestena* Linn.**

FOREIGN KOU.

Cordia sebestena is a shrub or small tree with ovate, subcordate leaves which are scabrous on the upper surface and slightly pubescent underneath. The flowers are large orange or scarlet and borne in terminal cymes. The fruits are snow-white.

It is a native of tropical America, but can quite often be found in cultivation. In Honolulu a few mature trees occur, as for example on Thomas Square and in private grounds on King Street. It is easily grown from seeds when the latter are quite fresh, and also from cuttings.

***Cordia myxa* Linn.**

Cordia myxa is a small sized tree fifteen to thirty feet in height, and is nearly glabrous. The leaves are ovate or elliptical-ovate, entire and have a somewhat wavy margin.

The inflorescence is corymbose and axillary, bearing very small, sessile, white or yellowish-white flowers. The drupe is fleshy, ovoid, yellowish-white and somewhat enclosed by the persistent and enlarged calyx.

Cordia myxa is a native of India, extending also to Burmah and Malay. It is wild along the Himalayas and flowers in March and April. The fruit, which is very mucilaginous, is used medicinally, the mucilage being given in diseases of the chest and also as an astringent gargle. It is also employed as a laxative in bilious affections, and the kernels are considered a remedy for ringworm. The

wood is gray, moderately hard, but is readily attacked by insects.

The tree was introduced by Prof. Koebele, and quite a number of specimens may be seen along the Pali Road.

Besides the above species there is in cultivation *Cordia Collococca* DC. a native of the West Indies, and another species, probably *Cordia alba* R. S., introduced by the U. S. Experiment Station under the name *Cordia latifolia*, with which it has nothing in common.

Tournefortia argentea Linn.

Tournefortia argenta is a small tree fifteen to twenty feet in height or taller, with closely placed leaves at the end of the branches, the former obovate-oblong, tapering at the base, and are covered with a whitish-gray, silky pubescence, as are also the twigs.

The numerous white flowers are borne in large terminal silky-pubescent cymes. The fruit is the size of a small pea, globose-depressed, smooth, and the nutlet is corky.

Tournefortia argentea is decidedly a beach tree and has a very wide distribution. It is by far the principal tree on the coral islets or atolls of the Pacific, as, for example, on Palmyra Island, where the tree encircles all the low coral islets. In its branches the common booby, *Sula piscator*, erects its roosting place. See Bulletin No. 4, College of Hawaii Publication, "Palmyra Island, With a Description of Its Flora," by the writer.

In Honolulu only very few trees are in cultivation, as on Young Street in the Japanese school grounds and one on the other side of Oahu beyond Haleiwa.

At Kahului, on the Island of Maui, there are several tall trees near the beach.

The tree is of little economic value, though quite ornamental.

VERBENACEAE

VERBENA FAMILY.

Besides the species of *Vitex*, *Tectona*, and *Duranta*, the family is represented by several species of *Clerodendron*:—*Cl. fragrans* Vent., a garden weed with pink and white flowers found along roadsides. The flowers have an overpowering odor.

Cl. Thomsonae Balf. is a climber and easily recognized by the white or cream-colored calyx and red corolla which brought it the name Bleeding Heart.

Cl. Siphonanthus R. Br. is also in cultivation but quite rare. One of the finest is *Cl. squamatum* Vahl, with scarlet inflorescence and flowers, and dark blue-black, fleshy berries.

Vitex pubescens Vahl.

Vitex pubescens is a large evergreen tree with quadrangular branches. The leaves consist of five leaflets which are sessile, and as the inflorescence, are densely clothed with a soft, tawny pubescence. The inflorescence is dense, pyramidal, three to five inches across. The bracts are persistent. The drupe is small, globose and bluish-black.

This species, of which there is only one specimen in Honolulu, in Dr. Hillebrand's garden, is a native of India, Burmah and the Andaman Islands. The wood is smooth, gray, hard and close-grained.

Another species of *Vitex* not definitely identified is a large tree with gray bark and very hard wood; the leaves are three-foliolate and densely pubescent, as are the young branches. The flowers are blue and axillary, the drupe globose and about half an inch in diameter. It may be identical with *V. vestita* Wall.

Tectona grandis Linn.

THE TEAK TREE.

Plate LXXIII.

The *Teak*, when full-grown reaches a height of eighty to one hundred feet, has quadrangular branches which are stellately tomentose. The leaves are very large, especially the young ones or those of seedlings, measuring sometimes three feet. The flowering panicles are terminal, eighteen inches or more in diameter, bearing numerous flowers, only few of which are fertile; the corolla is only one-fourth inch long, and white. The fruit is a drupe two-thirds of an inch in diameter, four-celled, with a central cavity which is densely hairy; the calyx, which is persistent and encloses the fruit, is ovoid to subpyramidal, membranous and often reticulately nerved.

The *Teak* is a large deciduous tree, indigenous to the peninsulas of India, the drier regions of Eastern Java, Sumatra, and is also found on a few islands of the Indian Archipelago. In Burmah it extends to the twenty-fifth degree of north latitude, but no exact information is available in regard to the area under *Teak* in India; it is estimated, however, that the supply is practically unlimited. The most extensive *Teak* forests occur in upper Burmah and are commercially the most important of all forests in British possession. The *Teak* does not form natural pure forests except on alluvial soils, in which the growth of the *Teak* is rather rapid, thus giving it an



Tectona grandis Linn. f.

Flowering and fruiting specimen.

advantage over competing vegetation. Owing to its commercial value *Teak* has been planted extensively in India, the Andaman Islands, and other neighboring countries.

The sapwood of the *Teak* is white and small, while the heartwood when cut gives off a pleasant, rather strong aromatic odor, the color of the heartwood is a dark golden yellow, which on seasoning darkens into brown and becomes mottled with darker streaks. It is moderately hard, exceedingly durable, does not split, warp, shrink nor alter its shape when once seasoned. Most of the Burmese pagodas or shrines are carved of *Teak*, its durability is mainly due to a large quantity of resinous fluids that it contains, which fill the pores and thus resist the action of water. Teak-wood two thousand years old seems perfectly good at the present day.

The leaves of the *Teak* are said to yield a dye of a red or yellow color used mainly for dyeing silks.

The native physicians of Burmah recommend the medicinal properties of the *Teak* for various ailments, for example, a plaster of powdered wood for bilious headaches and for dispersion of inflammatory swellings. Charred wood saturated with poppy juice and reduced to a smooth paste is used to relieve swellings of the eyelids, etc. The bark is employed as an astringent and the oil of the nuts, which has an agreeable odor, is used as a hair tonic, and is supposed to remove itching of the skin.

Though cultivated in many tropical countries, the tree is rare in Honolulu, only very few trees exist, perhaps only a half-dozen in all. One can be found on the Government Nursery grounds on King Street and others on Mrs. Jaeger's grounds on King and Punahou Streets, and on Mrs. Foster's premises on Nuuanu Street. Owing to its deciduous character and rather slow growth it is not a tree to be recommended for ornamental plantings.

***Duranta repens* Linn.**

GOLDEN DEWDROP.

Plate LXXIV.

Duranta repens, commonly known as *Duranta plumieri* Jacq., is an unarmed, glabrous, erect shrub six to ten feet high with the branches often drooping. The leaves are obovate-elliptical, the base is wedge-shaped and the margins toothed above the middle. The axillary racemes form terminal panicles, which are slender and spreading with the flowers mostly on one side of the rachis; the former are blue or white; the fruit is fleshy, ovoid, and yellow.

Plate LXXIV.



Duranta repens L.

Flowering branch.

Duranta repens is a native of tropical America, but is widely cultivated in the tropics. In Honolulu it is quite plentifully planted as a hedge for which it is splendidly adapted. The genus was named in honor of Castor Durantes, a botanist who died in 1590 in Rome.

Mention must be made of *Petraca volubilis* Jacq., a climbing shrub with long racemes of blue flowers and very rough, scabrid, grayish-green leaves, which gave it the name Sandpaper Vine. The ordinary, now naturalized, *Lantana*, *L. camara* L., belongs also to the family *Verbenaceae*.

SOLANACEAE

POTATO FAMILY.

The *Potato* family is represented by several genera of which the most noteworthy are the following: *Cyphomandra Hartwegi* Sendt., a native of New Granada, cultivated on account of its ovoid fruits, which remind one of the taste and flavor of the tomato, whence it is known as Tree-tomato. It makes excellent preserves, and is also palatable uncooked, stewed it makes a delicious desert. To the vines belong *Solanum Wendlandii* Hook. f., the Potato vine, with large many-flowered cymes of blue flowers an inch and a half in diameter, and another species with smaller, blue flowers. One of the finest climbers, with large, yellow flowers is the Golden Cup, *Solandra grandiflora* Sw., a native of Mexico and Central American Islands. It is easily grown from cuttings or seeds. Of shrubs the following may be mentioned: *Cestrum nocturnum* L., known here as Chinese Inkberry, and very common in Honolulu, especially in Nuuanu Valley; it is a native of tropical America; others are *Cestrum diurnum* L., also called Chinese-Inkberry in Honolulu, and *C. aurantiacum* Lindl. with yellow flowers. The latter is not common.

Of interest is also *Datura arborea* Linn., the so-called Angel's Trumpet, a small tree with ovate-lanceolate leaves which have the margin entire; the flowers are large, white, trumpet-like, and have a musky odor; the calyx is spathe-like and the limbs of the corolla are long, facts which distinguish it from *Datura suaveolens* H. et B. The latter has an inflated calyx with five obscure teeth, short corolla limbs, and an angular tube. Both species are probably in cultivation. They are natives of Chile and Peru. Specimens are rather rare in Honolulu, but common on Hawaii from Hilo to Glenwood, along the Volcano Road.



Jacaranda ovalifolia R. Br.
Flowering branch of the Jacaranda.

BIGNONIACEAE

BIGNONIA FAMILY.

The *Bignonia* family, which is represented in these Islands by the cultivated species of flowering trees described in the following pages, has also several vines of great beauty well established in the residence section of Honolulu, such as the orange trumpet vine, *Pyrostegia* (*Bignonia*) *venusta*, *Bignonia unguis-cati*, *Cat's-claw Climber* or *Hug-me-tight*, formerly known as *Bignonia tweediana*; the graceful *Bignonia jasminoides* with pale purplish flowers, and one or two others which do not come within the scope of this work.

The family belongs decidedly to the tropics, and possesses about one hundred genera with four hundred fifty or more species.

Tecomaria capensis (Thbg.) Fenzl., supposedly a native of Brazil, but found wild all over the Cape of South Africa, cannot well be omitted. It is a shrub but more often a low bush with prostrate runners. The flowers are borne in terminal racemes, and are of a scarlet color. It fruits rarely, the capsules are linear and compressed. Shrubs of this species may be seen at the Haleiwa Hotel grounds, at the College of Hawaii Campus and elsewhere.

Parmentiera cerifera Seem., the Candle Tree, is of recent introduction. Specimens have been planted at the College grounds. The tree forms large forests in Panama, which are covered at all seasons with long, yellow, candle-like fruits.

Jacaranda ovalifolia R. Br.(Syn. *JACARANDA MIMOSAEFOLIA* D. Don.)

JACARANDA.

Plate LXXV.

The *Jacaranda* is a very handsome medium-sized tree with bipinnate leaves which remind one of those of the *Poinciana*. The leaflets are rhomboid, oblong, somewhat pointed and little over one-fourth of an inch long. The handsome, pale bluish-purple flowers are arranged in large terminal cymes. The calyx is small, while the bluish bell-shaped corolla is two inches long; the tube is curved below, inflated above, and the limb two-lipped, with one lip two-lobed, the other three-lobed. The fruit is a capsule, circular in outline and flat.

The genus *Jacaranda* possesses more than thirty species distributed from the Bermuda Islands to Brazil. The tree in question is a

native of Brazil and Argentine, but is cultivated for ornamental purposes in many tropical countries. It flowers in the early spring before the appearance of the leaves and is exceedingly striking when in the height of its flowering season.

It is quite extensively planted in and about Honolulu; fine specimens can be seen along King Street, Keeaumoku Street and in other parts of Honolulu. The tree is at any time an object of beauty on account of its handsome, graceful foliage, and when bare it is conspicuous for the mass of blue, bell-shaped flowers.

It is worthy of being planted more extensively; an avenue of this elegant tree would enhance the beauty of Honolulu considerably.

Sparattosperma vernicosum (Cham.) Bur. et K. Sch.

(Syn. SPARATTOSPERMA LITHOTRIPTICUM Mart.)

Frontispiece.

Sparattosperma vernicosum is a magnificent tree which becomes bare for a certain period in the year just before flowering. It is medium sized, somewhat buttressed at the base, has a straight trunk and a few ascending branches. The long petioled leaves consist of five leaflets, digitately arranged. The inflorescence is a terminal panicle bearing a profusion of canary-yellow flowers in the summer months when the tree is otherwise bare of foliage.

It is a magnificent spectacle when in full bloom and certainly deserves to be cultivated. It is a native of Brazil, but can now be found in many botanic gardens in the tropics. In Honolulu there are only two mature specimens, one of which flowered profusely two years ago for the first time. One is on Judd Street, the other in Mrs. M. E. Foster's premises on Nuuanu Avenue. The writer brought two young trees of this specimen with him from Java. They were grown at Buitenzorg from seed. It is known also as *Sp. lithotripticum*, and is famous as a medicinal remedy, taking the place of lithotripsy, whence the specific name. The species was introduced by Dr. W. Hillebrand.

Tecoma stans (L.) Juss.

ROBLE AMARILLO.

The *Amarillo* is an erect, branched shrub or small tree reaching a height of about twelve feet when full-grown. The opposite leaves are odd-pinnate, about eight inches long, consisting of five to seven lanceolate or oblong-lanceolate leaflets, with sharply serrated margins. The flowering panicles are terminal, with the flowers racemously arranged on the few branches; the yellow bell-shaped corolla is about

two inches long; the capsular fruit is linear, six inches long by one-third of an inch wide.

The *Amarillo* is merely an ornamental shrub and is planted mainly for its showy yellow flowers. It is a native of tropical America, but has found its way into many tropical countries, where it is cultivated. In Honolulu it occurs here and there in gardens and private grounds. A well-established specimen may be found in the Queen's Hospital grounds.

***Spathodea campanulata* P. Beauv.**

FOUNTAIN TREE, OR TULIP TREE.

Plate LXXVI.

The *Fountain* or *Tulip Tree* is of medium size, but occasionally reaches a height of seventy or eighty feet. The leaves are odd-pinnate, consisting of usually nine leaflets which are elliptical-oblong, slightly pointed at the apex and of a dark green color; the upper leaflets are larger than the lower ones. The large flowers, which are borne on the ends of the branches, are bright orange-red with golden-yellow margins. The ground beneath the trees is often thickly covered with the exceedingly striking and handsome flowers.

The unexpanded flowers contain a quantity of water, which fact has secured for this tree the name "*fountain tree*" in India, where it is cultivated as an ornamental shade tree.

The genus consists of three species, all of which are natives of tropical Africa. The species in question has been in cultivation in many tropical countries on account of its very conspicuous flowers.

In Honolulu there are only a few specimens, the largest ones occurring in Mrs. Jaeger's and in Mrs. Foster's grounds, on Punahou Street and Nuuanu Avenue respectively. Smaller ones grow in Mr. Samuel Damon's grounds at Moanalua Gardens. The trees do not seed here, but could easily be grown from cuttings, and ought to be planted more extensively in avenues.

In regard to the uses made of this tree, other than ornamental, nothing definite is known.

The seeds of this tree are whitish, fine, fluffy, and fill a capsule which is boat-shaped and about ten or twelve inches long. The capsules are used by the children of the natives in Java as playthings, as they make perfect little canoes. Seeds have been imported from Madagascar and the writer has also brought them from Java, together with living seedlings.



Spathodea campanulata Beauv.

Fountain or Tulip Tree.

Flowering specimen; to the right, branch with flower buds.

The *Fountain* or *Tulip Tree* will not be a rarity in Honolulu in the near future, as over 2000 seedlings are on hand at present.

***Crescentia cujute* L.**

CALABASH TREE.

The *Calabash Tree* is a glabrous tree with stout, stiff, horizontally spreading branches, and reaches a height of about fifteen feet. The leaves are fascicled or alternate, and spatulate in outline, obtuse or shortly pointed, narrowing at the base and subsessile—that is, with hardly a leaf-stalk. The upper surface of the leaves is glossy. The flowers, which have a rather foetid odor, grow singly or in pairs, are curved and are pale green with faint purplish lines; the five equal lobes are pointed and toothed. The fruit is globose, green or purplish and six to ten inches in diameter.

Of the five species of the genus *Crescentia*, the *Calabash Tree* is the best known. It is a native of the West Indies and South America, but is occasionally cultivated in many tropical countries.

The fruit is used for receptacles of various kinds and can be shaped to any desired form while growing, by means of binding. The juice of the fruit is used as a purge, and is said to cause abortion in cattle. Medicinally the pulp is employed together with other ingredients as a cough remedy.

The wood, which is rather tough and flexible, is used in Jamaica for shafts, saddles, chairs and other articles requiring such wood.

In Honolulu quite a number of trees of this species can be found in the various grounds of private residences, especially along the lower part of King Street, also in the Capitol grounds. It is conspicuous for its large globose fruits, which are almost sessile on the long, spreading, stiff branches.

***Kigelia africana* (Lam.) Benth.**

SAUSAGE TREE.

Plate LXXVII.

The *Sausage Tree* is a wide-spreading deciduous tree about thirty feet in height, with odd-pinnate, alternate leaves; the leaflets are ovoid to elliptical, and pointed or rounded at the apex. The large showy flowers, which range in color from dark purplish-red to magenta, are about four inches in diameter, and bell-shaped; they are arranged in long pendulous loose panicles and last only one day. The remarkable fruits are grayish in color, oblong in shape, and



Kigelia africana (Lam.) Benth.

Sausage Tree.
Flowering specimens.

are suspended on the peduncles which increase in length during the maturing of the fruit. The latter is fifteen to twenty inches long and three to four inches thick. The resemblance of the fruit to a large sausage gave it the rather undignified name "Sausage Tree."

Kigelia africana, as the specific name implies, is a native of Africa, especially of the western tropical coast of that continent. It has been in cultivation, however, in most tropical countries and has found its way also to Hawaii.

As the tree is deciduous—that is, bare of leaves for a certain time during the year, it is not well adapted for street planting; another disadvantage is the dropping of the flowers shortly after their expansion.

In Honolulu there are several of these trees; the largest and finest can be found in the Queen's Hospital grounds, while others are near the entrance in Mr. Charles Atherton's grounds on King Street, and still others at Moanalua Gardens and Kapiolani Park.

Except for ornamental purposes the tree is of no economic value. When planted, however, it should be given plenty of room, as it is a spreading tree, developing a symmetrical crown.

ACANTHACEAE

The family *Acanthaceae* is represented by four genera out of the 204, which possess about 2000 species, all natives of tropical and warm regions. Besides *Graptophyllum pictum*, described below, there are in cultivation *Thunbergia erecta* (Benth.) And., an erect glabrous shrub with a slender four-angled stem; the white flowers are axillary and solitary; *Thunbergia grandiflora* (Rottb. et Willd.) Roxb., a large, coarse, somewhat woody vine, with large, axillary flowers which may be solitary or arranged in long pendulous racemes; the corolla is of a pale blue; it is a native of India.

Barleria cristata L. is a much-branched shrub with violet flowers and two persistent green sepals, which are laciniately toothed. It is a native of India, and is usually grown as a hedge. It grows freely from cuttings.

Sanchezia nobilis Hook., an erect shrub, is also cultivated; it is a native of Ecuador.

Of the family *Scrophulariaceae*, *Russelia juncea* Zucc., the Coral Flower, an erect, nearly leafless plant, with angled stem and bright red tubular flowers, is often planted on rockeries. It is a native of Mexico.

Plate LXXVIII.



Graptophyllum pictum (L.) Griff.

Flowering branch of the green leaved variety.

Graptophyllum pictum (L.) Griff.

(Syn. GRAPTOPHYLLUM HORTENSE Nees.)

MORADO.

Plate LXXVIII.

The name *Morado*, which is of Spanish origin, is applied to this species in the Philippines and for want of a name in Honolulu may be adopted here.

The *Morado* belongs to the *Acanthus* family (*Acanthaceae*) and is an erect branching shrub six to ten feet in height; the leaves are opposite, oblong to broadly elliptic, somewhat pointed at both ends, four to eight inches long, two to four inches wide, green and variously mottled with white or yellowish-white, or dull purple, with short leaf-stalks. The two-lipped, dull purple or reddish-purple flowers are borne in terminal panicles and are one and a half inches long, the upper lip is shortly two-fid, the lower three-lobed, stamens two with two small staminodia; the ovary is four-ovuled.

The fruit is an oblong, hard, long-stalked capsule. The *Morado* is a native of New Guinea and the neighboring islands, but, owing to its variegated leaves, which remind one of the crotons, and the rather handsome purple flowers, has been in cultivation in many tropical countries, and can be found in Honolulu in a great many residential grounds.

The name *Graptophyllum* is from the Greek, meaning "writing" and "leaves" in allusion to the variously marked leaves. The genus consists of four species, natives of Australia and Polynesia.

Graptophyllum hortense Nees., a horticultural variety of this species, has bronze-colored mottled leaves; it occurs sparingly in Honolulu.

RUBIACEAE

COFFEE FAMILY.

The *Coffee* family is an exceedingly large one, comprising about 400 genera with over 5500 species, which occur mainly in the tropics and sub-tropical regions. Of introduced genera only a few are worth mentioning. Two species of *Coffee* are under cultivation as *Coffea arabica* L. and *Coffea liberica* Bull., the latter growing wild as an escape from cultivation in the mountains back of Honolulu, the former is cultivated extensively in Kona, Hawaii.

Ornamental species are *Rondeletia odorata* Jacq., a native of



Ixora macrothyrsa Theijsm. et Binn.

Ixora.

Cuba and Mexico. Specimens may be seen in Mrs. M. E. Foster's premises, in the grounds of the Central Grammar School, and elsewhere. It resembles a small *Ixora* with small rugose leaves, the flowers are more of an orange-red. *Gardenia florida* L., the fragrant white *Gardenia*, is commonly cultivated. The flowers are usually double. It is a native of China and Japan, but is now widely planted. A little over a year ago the writer introduced a few plants of the exceedingly handsome *Mussaenda erythrophylla* Schum. et Thon. from Singapore. It is a native of the Congo and the West Coast of Africa, and is considered one of the finest ornamental plants. It is in flower practically all the year round, and is conspicuous on account of the large, ovate bracts, which are of a deep carmine red. It is easily grown from cuttings.

Cinchona succirubra R. et P., the *Quinine Tree*, a native of Peru, and Ecuador where it grows wild on the slopes of Mt. Chimborazo, has been planted on Maui, where a few trees may still be seen near Makawao village.

***Ixora macrothyrsa* Theijsm. et Binn.**

IXORA.

Plate LXXIX.

This exceedingly handsome species is a large glabrous shrub with leaves nearly a foot long, oblong-linear in outline. The flowering cluster is very large, often eight inches across, bearing many deep red flowers with lanceolate obtuse lobes. It is a native of Malay, but now one of the most commonly cultivated species. It is easily grown from cuttings. In Honolulu it can be found in practically every yard and is also sold by florists.

Ixora coccinea Linn. is another species commonly cultivated in Honolulu. It is a shrub with sessile or subsessile cordate leaves, and corymbiform, densely flowered cymes. The corolla is scarlet. It is a native of the Malay Peninsula and Ceylon. It flowers throughout the year.

Hybrids of *Ixora macrothyrsa* are also in cultivation, besides one or two species of *Pavetta*.

HONOLULU STAR-BULLETIN PRESS

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